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# ASPECTS OF COMPETITION IN MANUFACTURING INDUSTRY

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It is only natural that manufacturing industry—the foundation of our economic life—should be the subject of frequent investigation. Detailed studies of particular industries have long been part of the stock-in-trade of the professional economist. Broader aggregative statistics—covering production, employment, profits and the like—are collected by government agencies and give the essential basis for general economic analysis. Sampling techniques are also increasingly being used to obtain up-to-date estimates of these aggregates. But very little has so far been done in this field by the method of sample survey, with a questionnaire addressed to the individual businessman about his work, his policies and his attitudes. This article gives a report on the result of a sample survey of this sort, in which interviews were made with the owners or managing directors of nearly 900 firms in ten main industrial centres of Great Britain.

The survey, which was made in the spring of 1956, was undertaken with a view to studying the market, financial and other problems of small and medium-sized businesses. While the questionnaire covered a number of different aspects of each firm's operations, three of the focal points of study were the degree of competition facing the firm, its rate of growth and its sources of finance. Details have already been published of some of the results on the financial side of the survey. In this article I propose to bring together the more interesting findings on the first topic. In a subsequent article I shall deal with the growth of firms.[1]

## THE SAMPLE

The sample at our disposal consists of 876 manufacturing firms employing between 10 and 499 persons. The names of the firms were obtained by drawing addresses systematically from the list of manufacturing establishments kept by the Ministry of Labour for the purpose of its monthly inquiries into changes in employment. In principle, the list does not include establishments employing 10 or fewer persons, but, since the number of employees in a firm varies from time to time, a few establishments of this size occurred in the sample. At the other end of the scale, firms which employ 500 or more persons were excluded, and also public companies quoted on the Stock Exchange. Sampling took place in ten main areas: London and Middlesex; Bristol; Birmingham; Nottingham; Leicester; Liverpool and Birkenhead; Manchester, Bolton and Oldham; Sheffield; Leeds and Bradford; and Glasgow. These areas probably contain between a fifth and a quarter of all manufacturing establishments with 11 or more employees; but they do not, of course, contain a fully representative selection of industries. Hence, some highly localised industries, such as Potteries and Carpets, do not occur in the sample at all. In addition, a few industries and certain types of firm were specifically excluded from the inquiry on various grounds.[1]

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[1] Previous articles containing results from this survey are: H. F. Lydall, 'The Impact of the Credit Squeeze on Small and Medium-Sized Manufacturing Firms', *Economic Journal*, September 1957; J. A. Bates, 'The Finance of Small Business', this BULLETIN May 1958; and J. A. Bates, 'Hire Purchase in Small Manufacturing Business', *The Bankers' Magazine*, September and October 1957. The cost of the survey was covered by a grant under the Conditional Aid scheme for the use of counterpart funds derived from United States economic aid.

The aim of these procedures was to produce a sample of firms which would be broadly representative of small and medium-sized businesses primarily engaged in manufacturing. It was not possible to make the sample representative of all areas, since this would have entailed very heavy interviewing expense; and, in any case, as in all voluntary sample surveys, it was impossible to ensure that all units included in the original sample gave the required information. The average response rate to the questionnaire was 62 per cent; and there is no evidence that the response rate varied significantly between different areas, industries or sizes of firm. In general, the sample seems to be a reasonably good one, within the limits of the technique employed.

Fieldwork, which was carried out by interviewers from the Social Survey, began about the middle of April 1956 and was completed, for all but a few firms, by the end of June. The person interviewed was usually the owner of the firm, the senior partner of a partnership, or the managing director of a company. In a few cases some other official was interviewed if he seemed to be the most appropriate person to see. The interviews related to the activities and policies of the firm named in the address list, including any branch establishments, but excluding subsidiary or associated companies. No interviews were made at branch establishments.

## Some Characteristics of the Sample

Table I gives the composition of the sample by area, Table II by industry and Table III by size of firm. The industries are defined according to the Standard Industrial Classification and the numbers attached to the industries refer to the various S.I.C. Orders. Size of firm is measured by the average number of persons employed over the year 1955, excluding owners, partners, outworkers and canteen staff, and counting half the number of part-time workers.

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[1] For further details on the method of drawing the sample reference should be made to my article in the *Economic Journal*, September 1957.

### TABLE I

*Distribution of Firms by Area*

| *Area* | *Number of firms* | *Per cent*[1] |
|---|---|---|
| London and Middlesex | 231 | 26 |
| Bristol | 64 | 7 |
| Birmingham | 86 | 10 |
| Nottingham | 82 | 9 |
| Leicester | 66 | 8 |
| Liverpool and Birkenhead | 60 | 7 |
| Manchester, Bolton and Oldham | 76 | 9 |
| Sheffield | 57 | 7 |
| Leeds and Bradford | 67 | 8 |
| Glasgow | 87 | 10 |
| Total | 876 | 100 |

[1] Percentages in this and subsequent tables do not always add to exactly 100, because of rounding.

### TABLE II

*Distribution of Firms by Industry*

| *S.I.C. Order No.* | *Industry* | *Number of firms* | *Per cent* |
|---|---|---|---|
| 3 | Bricks, concrete, glass, etc. | 24 | 3 |
| 4 | Chemicals | 27 | 3 |
| 5 | Metal manufacture | 22 | 2 |
| 6 | Engineering | 166 | 19 |
| 7 | Vehicles | 31 | 4 |
| 8 | Other metal products | 138 | 16 |
| 9 | Precision instruments, jewellery, etc. | 23 | 3 |
| 10 | Textiles | 93 | 11 |
| 11 | Leather goods and fur | 7 | 1 |
| 12 | Clothing and footwear | 168 | 19 |
| 13 | Food and drink | 31 | 4 |
| 14 | Wood products | 29 | 3 |
| 15 | Paper and printing | 85 | 10 |
| 16 | Toys, brushes, rubber and plastic goods, etc. | 32 | 4 |
|  | Total | 876 | 100 |

### TABLE III

*Distribution of Firms by Size*

| *Number of employees* | *Number of firms* | *Per cent* |
|---|---|---|
| 10— 19[1] | 151 | 17 |
| 20— 29 | 154 | 18 |
| 30— 39 | 126 | 15 |
| 40— 49 | 86 | 10 |
| 50— 74 | 125 | 14 |
| 75— 99 | 54 | 6 |
| 100—199 | 111 | 13 |
| 200—499 | 57 | 7 |
| Not ascertained | 12 | — |
| Total | 876 | 100 |

[1] Includes 4 firms with less than 10 employees.

As one might expect, there was a high concentration of Other Metal Products firms in Birmingham and Sheffield, and of Textile and Clothing firms in Nottingham and Leicester, and in the Lancashire and Yorkshire towns. The largest proportion of large firms—within the range covered—was in Textiles, where 13 per cent employed 200 or more; but the distribution of firms by size (in terms of employees) varied remarkably little between industries.

Number of employees is, for many purposes, both the simplest and the most significant single measure of the size of a firm. But size can also be measured by turnover, value of assets and in other ways. In this sample 762 firms gave a figure for their turnover for the last accounting year; and 428 firms gave their total assets, as recorded in the latest available balance sheet. Some use has been made of the turnover figures to test hypotheses about the influence of size on economic behaviour, but, since these tests give very similar results to those obtained when the employment measure is used, they will not be discussed separately. This correspondence is, of course, not surprising, since turnover and employment are closely correlated.

Of the firms in the sample 773 (88 per cent) were private companies, 47 (5 per cent) sole owners, 46 (5 per cent) partnerships and 10 (1 per cent) public companies (unquoted on the Stock Exchange). Most of the sole owners were small—none had more than 50 employees—and partnerships were generally smaller than private companies. Only two partnerships employed more than 75 persons. Of the companies, 77 were subsidiaries of other companies and 92 had subsidiaries of their own. The smaller the firm the more likely it was to be independent.

Of the 773 private companies in the sample 18 were wholly owned by a parent company and 26 gave no information about the ownership of their shares. Of the remaining 729 companies, there were 279 (38 per cent) in which all the shares were owned by one family, 292 (40 per cent) in which one family owned a majority of the shares, and 158 (22 per cent) in which no single family owned a majority of the shares. The proportion of companies wholly owned by one family is largest amongst the small firms and diminishes as the size of firm increases, giving place to firms in which some outside interest has a minority shareholding.

Nearly a quarter of the private companies in the sample (apart from wholly owned subsidiaries) had only two shareholders, and two-thirds had no more than five shareholders. As might be expected, the number of shareholders varies inversely with the degree of family control. The number of directors ranges from one upwards, but four out of five companies had between two and four directors. This again depends to some extent on the closeness of control by a single family. Where all the shares are owned by one family the directors are also usually of one family. Where the family has only a majority or minority shareholding, the opposite situation holds. In four out of five of the private companies the directors owned all or most of the shares.

## Type of Work Done

Each firm was asked to give details of its 'main lines of business' and to indicate roughly what proportion of its total turnover was in each of these main lines. On the basis of the answers to these questions firms which did less than 25 per cent of their business in manufacturing were excluded from the sample. Of those included in the sample more than nine-tenths were engaged in manufacturing to the extent of at least 90 per cent of their turnover. The most common non-manufacturing activity was some form of trading.

Each firm's ' main lines ' were arranged in order of importance (in terms of turnover) and questions about the marketing side of the business were asked for each of the first two main lines separately. If either of these first two main lines proved to be a non-manufacturing activity it was excluded from our analysis; and in a few cases this meant that a second main line was promoted to the position of first main line. But in general the non-manufacturing lines were of subsidiary importance.

All the firms—naturally enough—had a first main line of business, but only 331 (38 per cent) were recorded as having a second manufacturing main line. Whether a firm claimed to have only one or several ' main lines ' would depend, of course, on its own interpretation of the phrase. The purpose of the question was to draw up an agenda, since a discussion about marketing policies and problems must be related to a fairly homogeneous group of products for which the policies and problems are broadly the same.[1] Experience showed, however, that in most cases the answers given to the questions about each main line separately were distributed in a similar manner, partly because many firms gave the same answers for each main line and partly because the differences, where they occurred, tended to cancel out. This permits us to concentrate attention on the answers relating to the first main line except in those cases where the answers relating to the second main line are significantly different.

We come now to a distinction between firms in respect of their ' type of work ' which will prove to be a great importance in our subsequent analysis. The work of manufacturers can be broadly divided into two classes: first, the production of products of their own design, intended for sale to all comers, and, secondly, work on products made to the specifications of the individual customer. Sometimes these specifications are drawn up by the customer, sometimes by the manufacturer; but, whichever applies, the quality of the relationship between the firm and its customer is quite different from that which exists between a manufacturer of a standard range of products and his market.

The question which was asked on this subject, in respect of each main line separately, was as follows: ' Do you mainly work for other firms on specification orders or do you mainly produce a range of your own products which you then try and place on the market? '[2] On the first main line 411 firms said they did ' mainly specification orders ' and 410 firms said ' mainly own products '; 51 firms said the division was about equal and 4 firms gave no answer. Amongst the firms with second main lines the distribution of answers (in respect of their second main line) was slightly different: 177 said their second main line was ' mainly specification orders ' and only 129 said it was ' mainly own products '. For firms with two main lines there is a fairly strong association between the type of work on the first line and on the second, but of the firms whose two main lines differed in type, rather more had a first line which was ' own products ' and a second which was ' specification orders ' than the other way round.

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[1] The information about main lines of business was also used as the basis for classifying firms by industry.

[2] The suggestion to include this important question in the questionnaire came from Mr. J. Downie.

Since the ' type of work ' distinction just considered is one to which frequent reference will be made in the following pages, it will be convenient to describe the firms which said they worked mainly on specification orders as ' jobbers ' and those which said they produced mainly their own products as ' marketers '. Those firms which said that their activities were about equally divided in this respect will be called ' mixed '.

As can be seen from Table IV, jobbers predominate in Metal Manufacture, Engineering, Wood Products, and Paper and Printing; while the marketers are in a majority in Bricks, Concrete and Glass, Chemicals, Textiles, Clothing, and Food and Drink. There is also a tendency for the proportion of jobbers to be less amongst larger firms than amongst smaller—this difference being especially marked for those employing 75 persons or more (see Table V). When the question is looked at for different sizes of firm within the five largest industries it appears that in Engineering and Clothing there is an independent size effect, while in Textiles and Paper and Printing there is

TABLE IV

*Type of Work on First Main Line, Analysed by Industry*
*(number of firms)*

| *S.I.C. Order No.* | *Industry* | *Mainly specification orders (jobbers)* | *Mainly own products (marketers)* | *About equal (mixed)* | *N.A.* | *Total* |
|---|---|---|---|---|---|---|
| 3 | Bricks, concrete, glass, etc. ... | 8 | 16 | — | — | 24 |
| 4 | Chemicals ... ... ... ... | 5 | 19 | 3 | — | 27 |
| 5 | Metal manufacture ... ... | 15 | 4 | 3 | — | 22 |
| 6 | Engineering ... ... ... | 99 | 54 | 11 | 2 | 166 |
| 7 | Vehicles ... ... ... ... | 16 | 14 | — | 1 | 31 |
| 8 | Other metal products ... ... | 73 | 60 | 5 | — | 138 |
| 9 | Precision instruments, etc. ... | 11 | 9 | 3 | — | 23 |
| 10 | Textiles ... ... ... ... | 23 | 64 | 5 | 1 | 93 |
| 11 | Leather goods and fur ... ... | 1 | 6 | — | — | 7 |
| 12 | Clothing and footwear ... ... | 52 | 108 | 8 | — | 168 |
| 13 | Food and drink ... ... ... | 8 | 21 | 2 | — | 31 |
| 14 | Wood products ... ... ... | 23 | 5 | 1 | — | 29 |
| 15 | Paper and printing ... ... | 66 | 13 | 6 | — | 85 |
| 16 | Miscellaneous ... ... ... | 11 | 17 | 4 | — | 32 |
| | Total ... ... ... ... ... | 411 | 410 | 51 | 4 | 876 |

TABLE V

*Type of Work Done on First Main Line, Analysed by Size of Firm*
*(percentages)*

| *Number of employees* | *Mainly specification orders (jobbers)* | *Mainly own products (marketers)* | *About equal (mixed)* | *Total (excluding N.A.)* | |
|---|---|---|---|---|---|
| | | | | *Per cent* | *Number of firms* |
| 10— 19 ... ... | 58 | 38 | 4 | 100 | 149 |
| 20— 29 ... ... | 46 | 47 | 7 | 100 | 153 |
| 30— 39 ... ... | 52 | 44 | 5 | 100 | 126 |
| 40— 49 ... ... | 53 | 43 | 3 | 100 | 86 |
| 50— 74 ... ... | 49 | 44 | 7 | 100 | 125 |
| 75— 99 ... ... | 41 | 56 | 4 | 100 | 54 |
| 100—199 ... ... | 37 | 55 | 8 | 100 | 110 |
| 200—499 ... ... | 25 | 68 | 7 | 100 | 57 |
| Total[1] ... ... | 47 | 47 | 6 | 100 | 872 |

[1] Including 12 firms whose size was not ascertained.

little or none. In Textiles the proportion of jobbers is small at all sizes of firm (within the range covered in this survey) while in Paper and Printing the opposite relation holds.[1]

More than half the jobbers and the mixed firms (242 firms out of 462) said that they were dependent for most of their specification orders on a fairly small number of customers; and of these, 175 said that it would be difficult to replace a customer if he stopped his orders. But there was no significant tendency for this proportion to vary with the size of the firm.

## THE ASSESSMENT OF THE COMPETITIVE SITUATION

One of the principal purposes of this survey was to throw light on the competitive situation in British industry. But in drawing up the questions to be asked on this topic we were faced by the difficulty that there is no accepted method of *measuring* the strength of competition. People are accustomed to making qualitative judgments about the strength of competition in a particular industry; but they do not all use the same criteria, nor do they necessarily form the same view about each case. Kalecki, following Lerner, suggested that the ' degree of monopoly ' should be measured by the reciprocal of the elasticity of demand.[2] But the elasticity of demand is no more easily measurable in practice than the strength of competition. And, in any case, it is clear that what really matters is the long-period elasticity of demand, which reflects the influence of *potential* as well as of *actual* competition.[3] Potential competition depends, in turn, on the difficulties of new entry, some of which are created or increased by the policies of the firms already in the industry.

In the absence of an objectively measurable criterion of competition it was necessary to use subjective and indirect methods of measurement. In the first place, each firm was asked to give its own—subjective—assessment of the strength of competition facing it. This question—like the doctor's question 'How do you feel to-day?'—is a useful starting point for an attempted diagnosis. But the answers may, of course, be biased. So, secondly, this was followed by a number of supplementary questions directed towards possible symptoms of strong or weak competition. These included questions about the knowledge of competitors' prices, the difficulties of new entry and the methods of setting prices. In the outcome it proved impossible to characterise the competitive situation with any degree of precision; but the qualitative assessments which emerge from these various approaches may help to fill in part of the picture.

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[1] Most of the Paper and Printing group were, in fact, printers.
[2] *Essays in the Theory of Economic Fluctuations*, p. 19.
[3] R. F. Harrod, *Economic Essays*, No. 8.

## OPINIONS ABOUT THE STRENGTH OF COMPETITION

The straight question, put to all firms in relation to each main line separately, was: 'Would you say, in this line, you are up against strong competition, moderate competition, or no competition to speak of?' It may be thought that few, if any, firms would want to accept the third alternative. But this was not so. On the first main line, 495 firms (57 per cent) said strong competition, 263 firms (30 per cent) said moderate competition and 116 firms (13 per cent) said 'no competition to speak of'. (In two cases no answer was recorded for this question.) On the second main line the division was 54 per cent, 30 per cent and 16 per cent respectively.

To judge by the answers to this question the most strongly competitive industry is Textiles (70 per cent said strong competition); but some of the smaller industries also registered high percentages (20 out of 27 in Chemicals said 'strong' and 24 out of 31 in Food and Drink). There is also a tendency for the answers to vary with the size of firm, a greater proportion of the larger firms saying that they are faced by strong competition (see Table VI).

TABLE VI

*Opinions on the Strength of Competition, Analysed by Size of firm*[1]
*(percentages)*

| *Number of employees* | *Strong competition* | *Moderate competition* | *No competition to speak of* | *Total (excluding N.A.) Per cent* | *Total (excluding N.A.) Number of firms* |
|---|---|---|---|---|---|
| 10— 19 ... ... | 48 | 33 | 19 | 100 | 151 |
| 20— 29 ... ... | 49 | 35 | 16 | 100 | 154 |
| 30— 39 ... ... | 66 | 22 | 12 | 100 | 125 |
| 40— 49 ... ... | 59 | 33 | 8 | 100 | 86 |
| 50— 74 ... ... | 49 | 35 | 15 | 100 | 124 |
| 75— 99 ... ... | 61 | 24 | 15 | 100 | 54 |
| 100—199 ... ... | 67 | 26 | 7 | 100 | 111 |
| 200—499 ... ... | 70 | 23 | 7 | 100 | 57 |
| Total[2] ... ... | 57 | 30 | 13 | 100 | 874 |

[1] First main line only.

[2] Including 12 firms whose size was not ascertained.

Further analysis shows, however, that both these relations are almost entirely a reflection of the influence of type of work (jobber or marketer), which, as we have seen, is correlated with both size and industry. Jobbers are, on the whole, less conscious than marketers of the existence of strong competition, and a greater proportion of jobbers said that they had ' no competition to speak of ' (see Table VII). As we shall see below, this difference shows itself also in other ways.

TABLE VII

*Opinions on the Strength of Competition Related to Type of Work Done*[1]

| *Type of work* | *Strength of Competition* | | | | | | | *Total* | |
|---|---|---|---|---|---|---|---|---|---|
| | *Strong* | | *Moderate* | | *None to speak of* | | *N.A.* | | |
| | *No.* | % | *No.* | % | *No.* | % | | *No.* | %[2] |
| Jobbers ... ... | 194 | 47 | 150 | 36 | 67 | 16 | — | 411 | 100 |
| Marketers ... ... | 274 | 67 | 96 | 23 | 39 | 10 | 1 | 410 | 100 |
| Mixed... ... ... | 27 | 54 | 13 | 26 | 10 | 20 | 1 | 51 | 100 |
| Not ascertained ... | — | — | 4 | — | — | — | — | 4 | — |
| Total ... ... | 495 | 57 | 263 | 30 | 116 | 13 | 2 | 876 | 100 |

[1] First main line only.

[2] Excluding N.A.'s.

The 116 firms which said that they had ' no competition to speak of ' were asked why that was so. Forty-two firms answered that they are specialists, saying, for example, ' we are experts in this field ', or ' very few can do this kind of work '. Another 42 firms said there was plenty of demand in relation to the available supply; and 12 firms said that most, or all, of their work was done for a single customer or for an associated company. Five firms said that they had an understanding with their competitors or were members of some association; 16 firms gave various other answers; and the remaining 5 firms gave no answer.

## KNOWLEDGE OF COMPETITORS' PRICES

In a perfect market every firm knows the market prices for its products. In an imperfect market there are no longer standard market prices for homogeneous products, and competition takes place through variations in quality, design and sales pressure, in addition to variations in price. Once price has ceased to be the sole consideration it may well be that firms pay less attention to it; but it is difficult to see how really vigorous competition can take place, even in an imperfect market, without active comparisons being made by firms of the prices and qualities of their competitors' products. The extent of knowledge of competitors' prices may, therefore, be used as a partial indicator of the degree of competition ruling in a market.

All firms in the sample were asked: ' Do you know the prices your competitors are charging? ' The answers, analysed by the answer to the question on strength of competition, are given in Table VIII. It will be seen that as many as 303 firms said that they did not know their competitors' prices. But this, in itself, is not so remarkable as the fact that 131 firms which had said they were faced by strong competition did not know their competitors' prices.

TABLE VIII

*Knowledge of Competitors' Prices Related to Opinions on the Strength of Competition*[1]

| *Strength of competition* | *Knows competitors' prices* | | *Does not know* | | *N.A.*[2] | *Total* | |
|---|---|---|---|---|---|---|---|
| | *No.* | % | *No.* | % | | *No.* | %[3] |
| Strong ... ... | 360 | 73 | 131 | 27 | 4 | 495 | 100 |
| Moderate ... ... | 144 | 55 | 117 | 45 | 2 | 263 | 100 |
| None to speak of ... | 52 | 49 | 54 | 51 | 10 | 116 | 100 |
| Not ascertained ... | 1 | — | 1 | — | — | 2 | — |
| Total ... ... | 557 | 65 | 303 | 35 | 16 | 876 | 100 |

[1] First main line only.

[2] Includes some who said ' We have no competitors '.

[3] Excluding N.A.'s.

There is a significant difference on this question between jobbers and marketers: more than three quarters of the marketers said they knew their competitors' prices, compared with only half the jobbers. This difference determines the differences between industries, with the exception of Textiles, in which more than three-quarters of firms know their competitors' prices, irrespective of whether they are jobbers or marketers. Apart from this, size of firm also has some influence: larger firms more often know their competitors' prices than smaller firms, and this is true both for jobbers and marketers. The explanation may be simply that larger firms have wider contacts and more numerous sources of information. A test was also made to see whether the causal influence might lie in the other direction—namely, that the firms which made it their business to find out about their competitors' prices grew most rapidly. But the data on growth of firms (to be discussed in a subsequent article) do not support this hypothesis.

It is quite instructive to consider the method whereby firms do find out about their competitors' prices. Few manufacturing firms are in a position to take the quotations of organised markets as a guide to the movement of prices. Of 557 firms which claimed to know their competitors' prices only 93 obtained this information directly from published sources, such as catalogues, trade journals and price lists. The majority—309 firms in all—derived their information from retailers, wholesalers and other agents or customers, who, presumably, were in touch with their competitors. Some 34 firms worked out their competitors' prices by subtracting trade margins from the prices shown in the shops. This appears to be a particularly common method in the Clothing industry. Another 41 firms learnt about their competitors' prices from the results of competitive tenders. This was most important in the Engineering industry. Finally, some firms obtained their information from their trade association or by direct contact with their competitors. Fifty-three firms said that prices were more or less fixed by their trade associations; 27 firms learnt of their competitors' prices from information circulated by their trade association; and 39 firms said they were in direct touch with their competitors. The industries in which these last three practices were most common were Engineering, Other Metal Products and

Paper and Printing. These are also the industries in which jobbers predominate, and it may well be that the jobbing firm is the firm which feels most strongly the need of some organisation to prevent price-cutting. Of the 53 firms which said their prices were fixed by their trade association, 32 were jobbers, 18 marketers and 3 mixed.

## Competition from New Entrants

In the ultimate analysis, as we have said, the test of whether a market is competitive is whether new firms can come into the trade with reasonable freedom. The new firms need not be newly-formed enterprises; they may also be existing firms which enter the trade by starting to sell a new line of products or to provide a new range of services. The conditions of new entry are practically never absolutely ' free ', since the markets for factors of production are generally imperfect. Capital, for example, is never freely available at a single market price to all comers , and this is often the major stumbling-block to the entry of new firms. Under conditions of full employment there may also be substantial practical difficulties in obtaining supplies of suitable labour and raw materials.

The people who should be asked about the difficulties of new entry are the potential or actual new entrants. But it would be difficult to locate ' potential new entrants ' even if one could accurately define who they were. It seems not unreasonable, however, to expect that firms which are already in an industry will know something about the difficulties of new entry. A few of them will be recent new entrants themselves; and many of them may have considered, at some time or other, the difficulties which are faced by potential new entrants. Indeed, it may be that this is one of the important considerations in the determination of a firm's own prices.[1]

In order to broach this topic with our sample of firms we first asked each of them whether, over the past few years, the *number* of their home competitors had increased significantly, decreased significantly, or remained about the same. In respect of the first main line 239 firms said the number of their home competitors had increased, 72 said it had decreased and 547 said it had remained about the same (18 firms gave no answer). In Textiles the proportion of firms which said that the number of their competitors had decreased was more than twice as great as in the sample as a whole.

The 619 firms which said that the number of their competitors had decreased or remained about the same were then asked: ' Why haven't new firms come in? ' Ninety-nine firms gave no answer, and 70 firms answered by saying that some firms had come into the industry while others had gone out. The remaining 450 firms gave altogether 572 answers to the question, some firms giving two or more reasons for the failure of new firms to come in. These answers fall into three main groups: first, there were 195 firms which mentioned difficulties on the demand side, of which 166 said that the market was limited, that there was a lack of demand, or that there was heavy competition, and 29 said that the market was shrinking, that it was a dying trade, or that there was a slump in the trade. Secondly, there were 215 firms which emphasised the shortage of skilled or suitable personnel, saying that theirs was specialised or craft work, or that it needed long experience. A few of these said that their work was dirty or unpleasant or that it required great physical strength. Thirdly, 100 firms mentioned the difficulty of getting enough capital; some of these made reference to the high cost of machines. Of the remainder, 16 firms said there were difficulties in getting raw materials or parts, 11 firms said that the market was dominated by large firms, 3 referred to patent restrictions and 3 said there was government regulation of entry. There were also 29 other miscellaneous answers.

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[1] I have advocated this view in ' Conditions of New Entry and the Theory of Price ', *Oxford Economic Papers*, October 1955.

Amongst the five large industries in the sample, answers of the first type were given most frequently by the Textile and Clothing industries; of the second by the Engineering and Clothing industries; and of the third by the Textile and Paper and Printing industries.

## Pricing Methods

One symptom of the competitive situation in an industry is the method of fixing prices. In a perfectly competitive market prices are, of course, determined by supply and demand; and the individual firm is a price-taker. But this is not the typical situation in manufacturing, as was first demonstrated clearly in the well-known paper by Hall and Hitch.[1] They reported, on the basis of interviews with 38 businessmen—of whom 33 were manufacturers—that most of them ' make no attempt to equate marginal revenue and marginal cost '. The businessmen in question operated a pricing policy along the following lines: ' prime (or "direct") cost per unit is taken as the base, a percentage addition is made to cover overheads (or "oncost", or "indirect" cost), and a further conventional addition (frequently 10 per cent) is made for profit.' Hall and Hitch called this the ' full cost ' method of pricing, and it is now generally accepted that ' full cost ' pricing, or the ' administered price ', is the typical method of fixing prices in manufacturing industry. But it was thought useful to check this hypothesis in the course of the present inquiry, in which a much larger sample of businessmen was being interviewed. The answers might also help to throw some light on the competitive situation in manufacturing.

It was decided to take it for granted that most firms use the ' full cost ' system, and the question to businessmen was phrased in the following terms: ' We are interested to know how firms decide their prices. Many firms, when quoting a price to a customer, or when judging whether it is worth their while to take on a job at a given price, add a certain percentage mark-up to their direct costs to cover overheads and profits. Do you do this? ' The question is biased; but there is no reason why it should give biased answers.

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[1] R. L. Hall and C. J. Hitch, ' Price Theory and Business Behaviour ', *Oxford Economic Papers*, No. 2.

Businessmen know their own business, and they have no incentive to agree with the suggestion contained in the question if they do not think it is true. As we shall see below, some businessmen gave a negative answer, even though their pricing method was effectively of the ' full cost ' type.

Of the total sample, 697 firms answered the question in the affirmative. The remaining 179 firms were then asked, ' How do you price your products? ' They answered as follows: 41 firms said their prices were fixed, or more or less fixed, by their trade association or by a parent or associated company; 38 firms said their prices were fixed by supply and demand, or by what competitors were charging; 11 said they were fixed by the customer (these would be jobbing firms); 9 said they were fixed by ' intuition '; and there were 37 miscellaneous answers. But in addition there were 43 firms in this group whose description of their pricing methods made it clear that they were in reality using a form of ' full cost ' pricing, even though they had originally denied it. Some of these, for example, charged a fixed amount per hour of direct labour. Others said that they worked out the costs and added a percentage for profit.

It seems, therefore, that at least 740 firms out of 876 were normally employing the ' mark-up ' or ' full cost ', method of pricing. There were some variations in the pattern of answers between industries, but not large ones. Amongst Textile firms only 80 per cent used the mark-up method, compared with 85 per cent for the whole sample; and 12 per cent said ' supply and demand ', compared with 4 per cent for the whole sample. An unusually high proportion of Paper and Printing firms (10 per cent) said their prices were fixed by their trade association, compared with 5 per cent for the whole sample.

The pricing method employed does not appear to bear any significant relation to the size of firm, nor to the answers to the ' strength of competition ' question, nor to the type of work done (jobber or marketer).

### VARIATION OF THE MARK-UP

Although the overwhelming majority of firms normally follow the full cost principle of pricing, it is possible that their adherence to this principle can be varied by special circumstances. So we asked the 697 firms which had acknowledged that they used the mark-up method whether the mark-up varied from one product to another or for the same product from time to time. To the first of these questions about half the firms replied in the affirmative, and to the second slightly more than half. Variability of the mark-up appears to be a little more common amongst the larger firms, but no significant difference in this respect occurs as between jobbers and marketers.

The same group of firms were also asked whether they had ever reduced the margin for any of the following reasons:

To get new customers
To obtain a large order
To secure contracts when under-employed

Because other firms reduced their prices
For other reasons

The wording of these questions, especially the use of the word ' ever ', was intentionally biased in favour of discovering any propensity to deviate from the strict mark-up rule. It is all the more surprising, therefore, that more than one-fifth (22 per cent) of the firms replied that they had *never* reduced the margin. About the same proportion gave this answer in each of the separate industries, with the possible exception of Clothing, in which 28 per cent of firms said they had ' never reduced the margin '.

From the answers to the prompted ' reasons ' it seems that the most common reason for reducing the margin is in order to obtain a large order: 60 per cent of all firms using the mark-up method had done this on some occasion. This is an interesting case because it shows up vividly the dilemma of the producer of manufactured goods and the inappropriateness of the textbook assumptions about perfect competition. In a perfect market, where each firm produces an identical product, there would clearly be no sense in giving special terms for large orders (except to the extent of any savings in office work and delivery costs). It is only where each firm faces an inelastic market for its products that an advantage can be gained by price discrimination; and this depends on different sections of the market, or different customers, having different demand elasticities. But price discrimination is generally considered to be a distasteful—and even somewhat immoral—method of operation, unless it can be shown to be associated with obvious economies to the seller. Such economies do normally arise in the case of large orders; and it is therefore accepted as legitimate to grant ' quantity discounts ' and other special terms for large orders. These can even be regarded as not being really discriminatory, since the same terms are open to all comers, provided they give a large enough order. Yet it is clear that such arrangements favour large customers.

The next most commonly given reason for reducing the mark-up was ' to get new customers ': 46 per cent of firms said they had done this. After this come the other two specified reasons, given in each case by just over a third of all firms. The various reasons are not mutually exclusive, and the questions were not designed to discover how frequently the mark-up had been reduced for each purpose. It is, therefore, impossible to say, on the basis of these figures alone, how important is each of the motives for price-cutting, or how frequently price-cutting takes place.

There does not appear to be any significant variation in the pattern of reasons for mark-up variation between firms of different size or between firms doing different types of work. But there is some difference, as one would expect, between the patterns of answers given by firms facing different degrees of competition. In order to test this hypothesis firms were grouped according to their opinion of the strength of competition on both main lines together. Firms which faced strong competition or moderate competition on both lines—or on the first only where there was no second—were treated as ' strong ' and ' moderate ' respectively. Those which faced strong competition on one line and moderate on the other were called ' part strong, part moderate '; and those which had ' no competition to speak of ' on either line were called ' none to speak of '. The results show that, while 18 per cent of firms facing ' strong ' competition had never reduced their margin, over one-third of those with ' no competition to speak of ' had kept absolutely inflexible margins. Firms facing ' moderate ' competition were in an intermediate position; but firms which faced ' strong ' competition on one main line and ' moderate ' on the other were apparently more ready to reduce their margins than any other group.

### Price Leadership

Two other matters which are closely related to the question of pricing method can conveniently be discussed here. These are price leadership and the response of prices to a change in wage rates.

Those firms which said, in answer to an earlier question, that they knew their competitors' prices were asked: ' Is there one important firm or dominant group of firms which usually initiates prices changes? ' If they said yes to this, they were then asked: ' Do you follow these changes? ' The total number of firms which said that there was price leadership in respect of their first main line was 102, or 19 per cent of those answering this question. On the second main line the proportion was slightly lower. Of these 102 firms, 75 said that they followed the prices changes initiated by the ' important firm or dominant group of firms ', 23 said that they did not follow these changes and 4 firms said that they themselves were the price leaders.

The proportion of firms acknowledging the existence of price leadership is larger in the Textiles and Other Metal Products industries than in the other major industries. Amongst the smaller industries Food and Drink shows the remarkably high proportion of 10 firms out of 26 saying that price leadership exists. In Wood Products, on the other hand, only one firm acknowledged the existence of price leadership.

There seems to be a slight tendency for the larger firms to be more conscious of price leadership than the smaller ones: the difference is especially noticeable amongst firms employing 100 or more persons, where more than one in four said there was price leadership. Larger firms also more commonly admit that they follow these initiated price changes; and the four firms in the sample which said that they were the price leaders were near the upper end of the scale (all had over 50 employees and three had over 100).

If these results are to be accepted as valid, price leadership would appear to be less common than is sometimes suggested. But a careful verdict on this issue would require much more intensive research than was possible on this occasion.

### Response of Prices to a Rise in Wages

Since the ' mark-up ' principle is the most widely practised method of pricing of manufactured goods, one would expect to find that any general increase in wages would be reflected, sooner or later, in an increase in prices proportional to the percentage increase in wages, weighted by the relative importance of wages in the direct costs of different industries. The ' mark-up ' principle, in other words, is an essential link in the wage-price spiral mechanism. An important practical question, however, is what degree of time-lag there may be between the rise in wages and the consequent rise in prices, since in the absence of lags, both in the response of wages to prices and in the response of prices to wages, the wage-price spiral could rapidly lead to runaway inflation.

The approach that was made to this question was to ask first: ' When was the last general increase in wages in your firm? ' After this, we asked: ' Did you raise any of your selling prices immediately? ' Nearly all the firms said that they had given a general increase in wages at some time in the past year or so, and could say whether or not they had raised any of their selling prices immediately. Hence the distribution of answers to this question can be used to compare different groups of firms from the point of view of the promptitude of their response to increases in wages, and so to throw some light on the types of firms which are likely to pass on increased wage costs most rapidly.

Of the 876 firms in the sample there were 30 which were unable to answer the question about the ' last general increase in wages ', mainly because they said they gave no ' general ' increases in wages. A few more firms failed to answer the question about the immediate raising of prices. Of the remaining 830 firms, 230 said that they raised some of their prices immediately after the last general increase in wages, and 600 said that they did not. The industries in which the largest proportions of firms passed on the wage increase without delay were Metal Manufacture, Engineering and Paper and Printing. These are also the industries in which jobbers predominate. Similarly, the industries in which only a very small proportion of firms reacted to the wage increase immediately—Chemicals, Textiles, Clothing and Food and Drink—are those in which more than two out of three firms are marketers.

This coincidence is so striking that it seemed reasonable to conclude that the principal determinant of whether a firm passes on a general wage increase immediately in higher prices is whether it is primarily a jobber or a marketer. And this hypothesis finds strong support from the figures in Table IX, which

TABLE IX

*Response of Prices to a Rise in Wages Related to Type of Work Done*

| *Type of work*[1] | *Some prices raised immediately* | | *None raised immediately* | | *Total (excl. N.A.)* | |
|---|---|---|---|---|---|---|
| | *No.* | *%* | *No.* | *%* | *No.* | *%* |
| Mainly specification orders... | 152 | 41 | 215 | 59 | 367 | 100 |
| Mainly own products ... | 51 | 14 | 306 | 86 | 357 | 100 |
| Some of each ... ... | 23 | 23 | 77 | 77 | 100 | 100 |
| N.A. ... ... ... | 4 | — | 2 | — | 6 | — |
| Total ... ... ... | 230 | 28 | 600 | 72 | 830 | 100 |

[1] In this classification the type of work done on both main lines is taken into account.

show that whereas 41 per cent of the jobbers raised their prices immediately, only 14 per cent of the marketers followed the same policy. A more detailed breakdown of firms, by both industry and type of work simultaneously (for the five largest industries), indicates that type of work is the dominant factor in causing a rapid wage-price adjustment in Engineering, Clothing, and Paper and Printing; but in Textiles the proportion of firms passing on the wage increase without delay is significantly below average for both types of work (19 per cent compared with 41 per cent for jobbers and 9 per cent compared with 14 per cent for marketers). In Clothing, although the proportion of jobbers passing on the increase is about the same as the average, the proportion of marketers is only 6 per cent.

The answers given to this question were also related to the opinions earlier expressed by firms on the strength of competition. This analysis showed that only 21 per cent of the ‘ strong competition ’ firms (classified on the basis of both main lines) had raised their prices immediately, compared with 39 per cent of the ‘ moderate competition ’ firms and 34 per cent of the ‘ no competition to speak of ’ firms. A check was then made to see whether this association was partly or wholly attributable to the influence of type of work (which is associated with strength of competition). So far as the difference between the ‘strong’ and ‘ moderate ’ firms is concerned, the influence of strength of competition appears to be independent of type of work: thus, amongst jobbers, only a third of the ‘ strong ’ firms had raised their prices immediately compared with one half of the ‘ moderate ” firms, while amongst marketers less than one eighth of the ‘ strong ’ firms had raised prices compared with a quarter of the ‘ moderate ’ firms. But the ‘ no competition to speak of ’ firms do not fit into this scheme of things, their responses being divided in approximately the same proportions as the ‘strong’ firms within the separate jobber and marketer groups.

A further test of the possible influence of demand on the response to a rise in wage costs was made by relating this response to the number of weeks’ work on order. Each firm had been asked: ‘ How many weeks’ work have you got on order at the moment? ’ Of the 876 firms, 34 gave no answer; 59 said they had no stock of orders; and the remainder had order books ranging in length from one week up to two years or more. A breakdown of the answers to the question about raising prices, according to the length of firms’ order books is given in Table X. It will be seen that proportionately fewer of the firms with less than 3 weeks’ orders on the books raised their prices immediately than of the remainder. But amongst firms with longer order books there is no consistent tendency for this proportion to rise. So far as it goes, therefore, this table suggests some relation between demand conditions and the speed with which costs are passed on in prices. Here again a check was made on the influence of type of work; but, although jobbers do seem to have slightly longer order books than marketers, this association is not responsible for much of the differences which occur in Table X. In other words, amongst both jobbers and marketers taken separately the proportion

TABLE X

*Response of Prices to a Rise in Wages Related to Length of Order Book*

| *Number of weeks' work on order book* | *Some prices raised immediately* | | *None raised immediately* | | *Total (excl. N.A.)* | |
|---|---|---|---|---|---|---|
| | *No.* | % | *No.* | % | *No.* | % |
| Nil ... ... ... | 7 | 13 | 49 | 88 | 56 | 100 |
| Up to 2 weeks ... ... | 19 | 18 | 88 | 82 | 107 | 100 |
| 3— 4 weeks ... ... | 43 | 34 | 85 | 66 | 128 | 100 |
| 5— 8 weeks ... ... | 52 | 31 | 118 | 69 | 170 | 100 |
| 9—12 weeks ... ... | 27 | 29 | 66 | 71 | 93 | 100 |
| 13—26 weeks ... ... | 45 | 27 | 121 | 73 | 166 | 100 |
| 27 weeks and over ... ... | 32 | 40 | 48 | 60 | 80 | 100 |
| N.A. ... ... ... | 5 | 17 | 25 | 83 | 30 | 100 |
| Total ... ... ... | 230 | 28 | 600 | 72 | 830 | 100 |

of firms with order books of less than 3 weeks who raised their prices immediately is significantly smaller than for firms with longer order books.

It is worth considering why jobbers should be more quick to pass on increased costs than marketers. The reasons are, I think, fairly obvious. In the nature of the case, firms working on ' specification orders ' quote an individual price for each order; hence, they are free to raise this quoted price immediately their costs increase. In many cases they will even have contracts with their customers which explicitly permit them to revise their prices in the event of an increase in costs. On the other hand, firms selling their ' own products ' have to issue price lists and to book their orders (in general) at these ' list prices '. Sometimes they advertise their prices; sometimes they are selling to distributors under contracts which control the resale prices to the ultimate consumers. All these arrangements contribute to a certain rigidity of prices. It takes time to prepare and issue new price lists; there may be some hesitation while inquiries are made to ascertain whether other firms are planning to do likewise; and in general the whole question will have to be considered more carefully than in the case of a firm which is working mainly on specification orders for a relatively few customers.

It must be remembered also that firms selling ' own products ' cannot adjust their prices in such an exact manner as those working on ' specification orders '. The ' own product ' is often sold at some rounded price, and there is considerable resistance to frequent revisions of the price. Hence, in a period of inflation, firms selling ' own products ' must move their prices upwards in a series of jumps. Wages are not the only costs that are changing; raw materials, fuel and power, transport costs and the like are also fluctuating. Since it is impossible for the firm to adjust its ' list prices ' every time there is a change in one of its direct costs, it must in practice absorb some of the cost increases for part of the time and, perhaps, compensate for this by charging more than is strictly ' necessary ' at other times. Hence a particular increase in wages may not always carry the firm's direct costs per unit above the critical level at which a revision of the price list is called for; and the wage increase may be absorbed, for at least a short time, in order to see what is happening to other costs, and particularly to the cost of raw materials.

## Conclusion

Although it is not possible to summarise the results of this inquiry in a few simple conclusions, there are one or two important lessons which emerge. First we have found that, on almost every issue, there are significant divergences between the responses of jobbers and marketers. This is, therefore, one of the most important distinctions to be drawn between firms in any study of competitive behaviour.

Secondly, we have found that the overwhelming majority of firms use the ‘ full cost ’ system of pricing. Most of these, however, admitted that they had sometimes reduced their ‘ mark-up ’ on direct costs in order to get more business.

Thirdly, on the response of firms to an increase in wages, we found that the tendency to pass on a wage increase immediately was much more marked amongst jobbers than amongst marketers. At the same time, the state of demand—as represented by the length of the order book—does seem to have an independent influence on the speed with which costs are passed on.

Finally, it seems that, on nearly all aspects, Textile firms exhibit a much more strongly competitive attitude than firms in other industries. More of them are marketers to start with. But even the jobbers in Textiles get high marks for competitiveness on several issues, such as, knowledge of competitors’ prices, pricing by ‘ supply and demand ’, and being slow to pass on wage increases in prices. Perhaps it was no accident that the theory of the competitive market arose in the period when the Textile industry was dominant in our economy!

# GROWTH AND STRUCTURE OF IRAQ'S POPULATION

## 1867–1947[1]

*By* M. S. Hasan

### Introduction

In the study of economic development, population is, in the main, of three-fold significance. First, on the demand side, growth of total population will ultimately increase the size of the market, while the change in the composition of population (i.e. age-sex, as well as tribal-rural-urban distribution) will alter the pattern of the market.

Secondly, on the supply side, an increase in the size of population will enlarge the volume of the labour force, while a change in the population composition, particularly its age distribution, will effect a change in the quality of the labour supply.

Thirdly, both these quantitative effects of population growth and qualitative effects of the change in its composition will significantly alter the factor proportions—namely, the ratio of human power (and needs) to natural (arable and mineral) resources.

The market aspect of population, the change in the size as well as the pattern of the market, is an essential question in economic development. The present paper, is however, confined to a study of population on the supply side and only in one country, Iraq. More specifically, total and regional growth including internal migration, of Iraq's population is studied in Section I of the present paper. Section II is devoted to changes in the tribal-rural-urban structure over the period, 1867–1947. The economically active part of Iraq's population, together with the actual occupational distribution, are analysed in Section III. Finally, the main conclusions, relevant for any Iraqi economic development policy, are drawn together in Section IV.

### I

Although the first Official Census of Iraq's population was taken in 1947, there are some population figures in the British Consular Reports, particularly around 1866–67; some estimates derived from a partial census of population of the Ottoman Empire in 1890; other British population estimates for 1900–1908 and 1919; finally there is the information based on the Iraq Government's general enumeration of population originally made for purposes of National Service and Elections in 1934. Despite the varying margins of error involved in these 'guesstimates', estimates and Census results, and also in the adjustment for boundary changes and gap-filling, they can, nevertheless, indicate the general trend of population growth in modern Iraq.

Table I shows the total and regional population from 1867 to the 1947 Census of Population. In the course of these three generations, Iraq seems to have almost quadrupled its population. In the last one and a half generations, the period 1905–1947, Iraq's population slightly more than doubled.

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[1] I am grateful to Mr. John Black, of Merton College, and Mr. E. F. Jackson, of St. Antony's College, Oxford, for their helpful criticism of an earlier draft of this paper.

This general trend of population growth has not been uniform among the various regions. Thus regional population has risen about five-fold in the North, over four-fold in the Centre, and well under three-fold in the South over the period 1867–1947. It may also be observed that this differential growth in the regional population of Iraq tends to increase over time. Thus, during the more recent period of 1919–1947, the population of the Northern region almost doubled, that of the Central region more than doubled, whereas that of the Southern region increased by under a quarter.

In order to throw into clear relief this total and regional growth of population, the absolute increases and the rate of population increase have been calculated in Table II.

TABLE I

*Total and Regional Growth of Iraq's Population, 1867–1947 (thousands)*

| *Division* | *1867* | *1890* | *1905* | *1919* | *1935* | *1947* |
|---|---|---|---|---|---|---|
| Northern Region ... | 265 | 401 | 540 | 703 | 1,041 | 1,347 |
| Central Region ... | 491 | 575 | 855 | 966 | 1,319 | 2,043 |
| Southern Region ... | 524 | 750 | 855 | 1,179 | 1,245 | 1,426 |
| Iraq ... ... ... | 1,280 | 1,726 | 2,250 | 2,848 | 3,605 | 4,816 |

See Appendix on Statistical Sources and Methods, particularly 4, 5, 6, 7 and 10.

TABLE II

*Absolute Increases and Annual Rates of Increase in Iraq's Population, 1867–1947 (thousands)*

| *Region* | 1867–90 | | 1890–1905 | | 1905–19 | | 1919–35 | | 1935–47 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Abs. | % | Abs. | % | Abs. | % | Abs. | % | Abs. | % |
| Northern ... ... | 136 | 1.8 | 139 | 2.0 | 163 | 1.9 | 339 | 2.4 | 306 | 2.2 |
| Central ... ... | 84 | 0.7 | 280 | 2.7 | 110 | 0.9 | 354 | 2.0 | 724 | 3.7 |
| Southern ... ... | 226 | 1.6 | 105 | 0.9 | 325 | 2.3 | 65 | 0.3 | 181 | 1.1 |
| Iraq ... ... ... | 446 | 1.3 | 524 | 1.8 | 598 | 1.7 | 758 | 1.5 | 1,211 | 2.4 |

See Appendix on Statistical Sources and Methods, particularly 12.

Generally speaking, this table shows that the rate of population increase rose up to 1905, then dropped slightly till 1935, since when it has considerably increased. In the early period of 1867–1890, Iraq's population rose at an average rate of 1.3 per cent per annum, but this rate of population increase rose to 1.8 per cent per annum between 1890 and 1905. This acceleration in the rate of population increase was not only checked, but slightly reversed during the period 1905–1935, when the rate first fell to 1.7 and later to 1.5 per cent per annum. It is therefore clear that it was only during the period since 1935 that Iraq's population began to grow at a rate markedly higher than at any other time from the middle of the nineteenth century onwards, 2.4 per cent per annum.

Just as the total growth of population was not uniform throughout the country, so the annual rate of increase was not uniform among the various regions. It is significant to note that, although the differences in the rates of regional population increase were not negligible even during the early period of 1867–1890, they increased appreciably since. The regional rates of population increase were 1.8 in the North, 0.7 in the Centre and 1.6 per cent per annum in the South during 1867–90; and 2.2, 3.7 and 1.1. per cent per annum during 1935–47. Further, it is not only the magnitude of the differentials in the regional population growth that have increased over time, but also their geographical direction, showing a relatively increasing decline in the Southern region and an accelerating rise, mainly in the Central but also in the Northern regions. Thus, in the period between 1935 and 1947, the annual rates of population increase in the Central and Northern regions were as high as 3.7 and 2.2 per cent per annum respectively, while their counterpart in the Southern region was as low as 1.1 per cent per annum.

How far can these differences between the regions in the absolute growth and the rates of increase of population be explained by differences in the regional birth and mortality rates?

TABLE III

*Birth and Mortality Rates for Three Major Cities*

| | *1927–1935* | | | | *1935–1947* | | | |
|---|---|---|---|---|---|---|---|---|
| *Item* | *Baghdad* | *Mosul* | *Basra* | *Average* | *Baghdad* | *Mosul* | *Basra* | *Average* |
| ' City ' pop. ... | 250,000 | 85,000 | 56,000 | 130,000 | 350,000 | 134,000 | 102,000 | 195,000 |
| ' Registered ' births ... | 7,500 | 3,159 | 1,145 | 3,934 | 11,378 | 4,074 | 2,140 | 5,856 |
| Birth rate per 1,000 ... | 30 | 37 | 20 | 29 | 33 | 30 | 21 | 28 |
| *Infant Morality* Rate per 1,000 live births ... | 244 | 243 | 403 | 290 | 162 | 83 | 242 | 162 |
| Registered deaths | 7,093 | 1,957 | 2,125 | 3,725 | 7,249 | 1,904 | 1,781 | 3,644 |
| Death rate per 1,000 ... | 28 | 23 | 38 | 26 | 20 | 14 | 17 | 17 |
| *Rate of natural increase per 1,000* | 2 | 14 | —18 | 3 | 13 | 16 | 4 | 7 |

See Appendix on Statistical Sources and Methods, particularly 9.

The vital statistics that are available do not admit of an accurate answer to this question. Such data as exist only refer to the three major ' cities ' (within their municipal boundaries) of Baghdad in the Central Region, Mosul in the Northern Region and Basra in the Southern Region, and for the period since 1927 only. But even their vital statistics are confined to the ' registered ' births and deaths, and though it is known that these fall short of the actual incidence, we have not even a rough estimate of the discrepancy between the registered and the actual figure. It is clear, therefore, that there are neither national data of vital statistics nor is there any information sufficiently representative of tribal-rural-urban areas.

The evidence, for what it is worth, seems to indicate that the statistics of births, deaths and infant mortality rates, as shown by Table III, may well be lower than the probable national average. Thus, relatively better health conditions and living standards in the three major cities entail a lower death and infant mortality rate than those that are likely to have been prevailing in the vast rural areas and the smaller towns which suffer from harder health conditions and stark poverty. The gross birth rate is likely to be lower in the former than in the latter, owing mainly to the decline in the size of family. The ‘ registered ’ birth and death rates are both likely to be biased downwards; the former because of fear of conscription; and the latter because of the burial tax, though this is more difficult to evade!

Table III shows that there has been a tendency for infant mortality and death rates to fall during the last two decades of our period. The average infant (less than one year) mortality rate fell from 290 per 1,000 live births in 1927–35 to 162 in 1935–47. This fall was most marked in Basra and Mosul, where it amounted to 161 and 160 per 1,000 respectively; while it fell only by 62 per 1,000 in Baghdad, owing perhaps partly to Baghdad being initially low, and partly to its being the most cosmopolitan and congested town in the country. As for the death rate, it too has fallen from 26 per 1,000 of population to 17 over the same period, for the same three cities. On the whole this fall in the death rate seems to have been more pronounced in the City of Basra than in Baghdad or Mosul, owing in part, probably, to wider coverage in the last two cities, and in part to the fact that Basra’s initial death rate was higher.

While both infant mortality and death rates show a downward movement during the period between 1927–1947, the average birth rate seems to have been more or less steady at 28–29 per 1,000. The rate of natural increase (the difference between the gross birth and death rates) shows an average of 4 per 1,000 during 1927–47. This rate of natural increase has been more marked in Basra, where it rose from—18 in 1927–35 to 4 per 1,000 in 1935–47, than in Baghdad, where it increased by 11 per 1,000 or in, Mosul, where it went up by only 2 per 1,000 over the same period.

It is evident that, to the extent that the available data of births and mortality rates fail to represent the actual regional birth and mortality rates, they also fail to afford a true measure of the extent to which differences in regional rates of population growth are due to differences in birth and mortality rates. At first sight, a comparison of Tables II and III would seem very fruitful; but, on further examination, the fact that the two Tables differ in their coverage, the former dealing with whole regions, while the latter is confined to the major city in each region; the fact that they do not refer to the same period; the fact that their respective margins of error are both large, Table III being subject to a higher margin of error—all these differences make the two Tables strictly incomparable.

But even so, one point of comparison may be of some, if limited, consequence: namely, that between the annual rate of regional growth of population and the rate of natural increase of these three larger cities, between 1935 and 1947. Thus, while the rate of natural increase of the Northern city of Mosul was 1.6 per cent, that of the Central city of Baghdad 1.3 per cent, and that of the Southern city of Basra was 0.4 per cent, the annual growth of their respective regions had been 2.2, 3.7 and 1.1 per cent during the same period. Bearing in mind the locational incomparability of these figures alone, one could only tentatively suggest that differences in rates of regional growth of population, particularly in the Central region, cannot be wholly accounted for by regional differences in birth and mortality rates. In the absence of any significant international emigration and migration, these regional differences between rates of natural increase and regional population growth must be due to internal migration between the regions, particularly towards the more urbanised Centre, and away from the more backward South, a conclusion which also seems to be borne out by the structural changes in the regional population of Iraq.

## II

While long-term growth of population normally indicates the general level of economic activity, the long-run movements in the composition of population show the relative changes in the structure of production and pattern of consumption. Table IV purports to throw some light on both the national and regional changes in the nomadic-rural-urban composition of Iraq's population since 1867.

The figures in this Table are not strictly comparable; they are derived from different sources, with different margins of error; and are classified on the basis of somewhat diverse criteria. They are, however, reliable enough to bring out the general trend of the change in the nomadic-rural-urban composition of population. Thus, around the middle of the nineteenth century, Iraq's population of just over one and a quarter million was made up of nearly half a million nomadic people who lived largely on the transport of the 'mediaeval' caravan trade; slightly over half a million 'rural' (agricultural and pastoral) population who depended on the land for cultivation or grazing; and just under a third of a million people who earned their living in larger or smaller towns, through handicraft industries, internal or Middle Eastern trade, and administration. But towards the middle of the present century, Iraq's population has grown to about five millions, of whom only a quarter of a million are strictly nomadic; 2.7 million are rural, while about 1.8 million are urban people, who earn their living either in the larger commercial and industrial towns or in the marketing towns which occupy a position intermediate between rural and urban life.

The trend of the change in the nomadic-rural-urban population structure, as shown in Table IV, is quite unmistakeable: in the first place, there had been an absolute as well as relative decline in the nomadic component of Iraq's population, falling absolutely from about half a million in 1867 to a quarter in 1947, and relatively from 35 per cent to 5 per cent of the total population.

TABLE IV

*Changes in the Nomadic-Urban Composition of Population, 1867–1947*
*(thousands)*

| *Date* | *Region* | *Nomadic* | *% of Total* | *Rural* | *% of Total* | *Urban* | *% of Total* | *Total* |
|---|---|---|---|---|---|---|---|---|
| 1867 | Northern ... | 70 | 26 | 140 | 52 | 55 | 22 | 265 |
| | Central ... | 115 | 23 | 170 | 39 | 206 | 41 | 491 |
| | Southern ... | 260 | 50 | 215 | 41 | 49 | 9 | 524 |
| | Iraq ... ... | 450 | 35 | 525 | 41 | 310 | 24 | 1,280 |
| 1890 | Northern ... | 93 | 23 | 223 | 55 | 85 | 22 | 401 |
| | Central ... | 65 | 13 | 340 | 59 | 270 | 28 | 675 |
| | Southern ... | 275 | 37 | 400 | 53 | 75 | 10 | 750 |
| | Iraq ... | 433 | 25 | 963 | 50 | 430 | 25 | 1,826 |
| 1905 | Northern ... | 153 | 28 | 254 | 47 | 133 | 25 | 540 |
| | Central ... | 70 | 7 | 468 | 78 | 317 | 15 | 855 |
| | Southern ... | 170 | 19 | 602 | 72 | 83 | 9 | 855 |
| | Iraq ... ... | 393 | 17 | 1,324 | 59 | 533 | 24 | 2,250 |
| 1930 | Northern ... | 82 | 11 | 519 | 66 | 174 | 23 | 765 |
| | Central ... | 64 | 4 | 855 | 56 | 531 | 36 | 1,460 |
| | Southern ... | 88 | 8 | 872 | 83 | 103 | 9 | 1,063 |
| | Iraq ... ... | 234 | 7 | 2,246 | 68 | 808 | 25 | 3,288 |
| 1947 | Northern ... | 70 | 5 | 795 | 59 | 482 | 36 | 1,347 |
| | Central ... | 25 | 1 | 1,074 | 53 | 944 | 46 | 2,043 |
| | Southern ... | 155 | 10 | 833 | 59 | 438 | 31 | 1,426 |
| | Iraq ... ... | 250 | 5 | 2,702 | 57 | 1,864 | 38 | 4,816 |

See Appendix on Statistical Sources and Methods, particularly 3.

Secondly, there had been, until 1930, at any rate, an absolute as well as relative increase in the rural population, which rose absolutely from just over half a million in 1867 to nearly two and a quarter million in 1930, and relatively from 41 per cent to 68 per cent of the total population respectively. Since 1930, however, while the absolute level of Iraq's rural population continued to rise up to 2.7 million in 1947, its relative magnitude declined to 57 per cent of the total population, owing to the rise of the urban population.

Finally, although the absolute level of the urban population rose from about a third of a million in 1867 to over one and three quarters in 1947, its relative position remained virtually constant at 24–25 per cent of the total population, until the period 1930–1947, during which it rose to 38 per cent of the total population.

These three trends in the composition of Iraq's population are not uniform among its various regions. The absolute and relative decline of the tribal population is much more marked in the Central than in the Southern and Northern regions. While the Central region's tribal population fell from about 115,000 in 1867 to about 25,000 in 1947, that of the Southern region declined from about 260,000 to 155,000, but that of the Northern region, with some upward and then downward fluctuations, remained absolutely constant over the same period. The same can be said of the decline in the relative position of the nomadic components of the various regional populations. Thus, while the fall in the nomadic proportion of the central region was from 23 per cent of the regional population in 1867 to 1 per cent in 1947, the Southern counterpart fell from 50 per cent to 10 per cent and the Northern equivalent from 26 per cent to 5 per cent.

This proportional decline in the tribal population corresponds to a proportional rise in the rural population in each region. Thus, while the Central region's rural population rose from about 170,000 in 1867 to 855,000 in 1930, the Southern and Northern counterparts went up from 215,000 and 140,000 to only 872,000 and 519,000 respectively. But the relative rise in the rural population was much more pronounced in the Southern region, rising from 41 per cent of the regional population in 1867 to 83 per cent in 1930, while the Northern and Central counterparts of this constituted a much smaller rise, from 52 per cent to 66 per cent in the former and from 36 per cent to 56 per cent in the latter.

After 1930, while the absolute level of rural regional population increased, however, the relative importance of the rural population declined in all the regions, because of the relatively sharp rise of the urban population. The early and more rapid beginning of the decline in the tribal and rise in the rural population, particularly in the Central region, and the later and slower fall in the tribal and rise in the rural population, particularly in the Southern region, explain the relatively greater fall in the rural population of the latter from 83 per cent in 1930 to 59 per cent in 1947, than in the former from 56 per cent to 53 per cent respectively.

As for the regional diversity of the absolute and relative change in the urban component of population, it is sufficient to point out that, up to 1930, the Northern region more than tripled and the Southern region slightly more than doubled the absolute level of their urban population, largely due to the rise of the marketing towns, while the equivalent change in the Central region was half way between. But the relative position of the urban population in the Northern and Southern regions remained almost constant over the same period, 1867–1947, while that of the Central region declined sharply from 41 per cent in 1867 to 15 per cent in 1905, mainly because of the sharp decline of the Baghdad handicraft industries under the competitive pressure of cheaper machine-made imports, and rose to 36 per cent by 1930. During the period 1930–47 the urban component of population rose to almost a third of the Northern and Southern regional population, while that of the Central region rose to just under half of its population.

## III

Another equally important aspect of population composition is the sex-age distribution, as it shows, or should show, the size and the nature of the labour force. In the absence of any reliable statistics of age-sex distribution prior to the first and only Census of population, the present discussion is confined to the structure of the economically active population, and its occupational distribution in 1947.

In order to calculate the economically active part of the total population, a lower and an upper age limit must be defined; such a definition must involve an arbitrary element. Table V, below, assumes that any person falling within the age group of 10–49 is a member of the economically active population. This definition is adopted partly because the Labour Law of 1936 does not, save for some dangerous occupations, stipulate any minimum or maximum age requirements, and partly because it seems in line with the economic conditions in Iraq. The Census of population shows, in fact, that child labour under the age of 10 was as high as 20,000 in 1947. Poor health, and hard labour conditions, malnutrition and short expectation of life suggest that economic activity ceases at around the age of fifty.

TABLE V

*Economically active and Inactive Population in 1947 (thousands)*

| *Region* | *Sex* | *Total population* | *Active* | *Inactive* |
|---|---|---|---|---|
| | | | *Age 10–49* | *Age 0–9 and 50+* |
| Northern ... | M | 587.7 | 278.2 | 309.5 |
| | F | 689.3 | 351.3 | 338.0 |
| | T | 1,277.0 | 629.5 | 647.5 |
| Central ... | M | 924.0 | 452.6 | 471.1 |
| | F | 967.7 | 492.8 | 474.9 |
| | T | 1,891.7 | 945.4 | 946.0 |
| Southern ... | M | 614.7 | 291.3 | 323.4 |
| | F | 780.7 | 390.8 | 389.9 |
| | T | 1,395.4 | 682.1 | 713.3 |
| Iraq ... ... | M | 2,126.3 | 1,022.1 | 1,104.2 |
| | F | 2,437.8 | 1,234.9 | 1,202.8 |
| | T | 4,564.1 | 2,257.0 | 2,307.0 |

See Appendix on Statistical Sources and Methods.

Iraq, like most underdeveloped countries, has a very young population, about half of it being under the age of 20. The relative proportion of active (producers/consumers) and inactive (consumers/non-producers) population is of paramount importance in economic development. Table V shows that out of a total non-nomadic population of 4.5 millions, 2.2 million are active and 2.3 million are inactive. The economic burden of the inactive or dependent population becomes even heavier when the sex distribution of the active population is considered in relation to differences in duration and type of economic activity of the sexes. Thus, the economically active population, which amounts to only 49.5 per cent of the total, consists of 22.5 per cent male-active and 27 per cent female-active. The remainder of 50.5 per cent which represents the inactive population, is divided into 24.2 male-inactive and 26.4 per cent female-inactive. This, in effect, means that the number of women who are actually active is much less than the total female population of working age.

This ratio of the economically active to inactive population throws into clear relief an important obstacle to economic development, namely, to maintain the inactive (consumer-non-producer) population in existence, the economically active population must first devote what is over and above their own subsistence not to capital formation, but rather to the maintenance of their dependents, i.e., parts of the population too young or too old to work. In order to increase output per head of population, the average productivity of the active population must be such as to create a surplus of production, which is sufficient not only to maintain the inactive as well as the active population, but also to augment the stock of capital. If the productivity of the active population is low and the proportion of the inactive population is high, as is the case of Iraq and other underdeveloped countries, then it is clear that this may constitute an important factor making for economic stagnation.

The economically active and inactive population, as shown in Table V, is more or less evenly distributed among the various regions. It is worth notice, however, that while the male component of the active population is highest in the Centre, lowest in the South and intermediate in the North, the female component of the active population stands in the opposite direction. The fact that the Central region shows higher active population in general and male-active in particular is indicative of inward internal occupational migration from the Southern and Northern regions.

It remains to discuss the occupational distribution of the population. The statistics of economic activity shown in Table VI serve to indicate only the usual pattern of employment and the relative orders of magnitude of occupations. Accordingly, they do not reflect accurately the volume of employment as they include the unemployable though of working age (e.g the sick and disabled, the students, etc.) and the unemployed population.

It is clear from Table VI, that the primary sector of the Iraqi economy,

TABLE VI

*Primary, Secondary and Tertiary Occupations in 1947*
*Absolute numbers in thousands, and each expressed as percentage of total national labour force*

| *Region* | *Sex* | *Primary* | % | *Second'y* | % | *Tertiary* | % | *Total* | % |
|---|---|---|---|---|---|---|---|---|---|
| Northern ... | M | 219 | 16.7 | 17 | 1.2 | 102 | 7.7 | 338 | 25.6 |
| | F | 24 | 1.8 | 2 | 0.1 | 12 | 0.8 | 38 | 2.7 |
| | T | 243 | 18.5 | 19 | 1.3 | 114 | 8.5 | 376 | 28.3 |
| Central ... | M | 250 | 19.1 | 48 | 3.7 | 217 | 16.4 | 515 | 39.2 |
| | F | 23 | 1.8 | 4 | 0.3 | 11 | 0.8 | 38 | 2.9 |
| | T | 273 | 20.9 | 52 | 4.0 | 228 | 17.2 | 553 | 42.1 |
| Southern ... | M | 216 | 16.4 | 23 | 1.9 | 125 | 9.7 | 364 | 28.0 |
| | F | 16 | 1.2 | 2 | 0.1 | 4 | 0.3 | 22 | 1.6 |
| | T | 232 | 17.6 | 25 | 2.0 | 129 | 10.0 | 386 | 29.6 |
| Iraq ... | M | 685 | 52.2 | 88 | 6.8 | 444 | 33.8 | 1,217 | 92.8 |
| | F | 63 | 4.8 | 8 | 0.5 | 27 | 1.9 | 98 | 7.2 |
| | T | 748 | 57.0 | 96 | 7.3 | 471 | 35.7 | 1,315 | 100.0 |

See Appendix on Statistical Sources and Methods.

which consists of agriculture and livestock, fishing and hunting, accounted for 748,455 workers, 57 per cent of the total occupied population according to the 1947 Census. These figures, though they adequately reflect the number of men occupied, underestimate the proportion of women engaged in this sector. Thus, while men employed in the primary sector account for 52.2 per cent of the total occupied labour force, women in the primary sector account for only 4.8 per cent. The downward bias in the figures of the employment of women is largely due, I think, to a social attitude which considers the household to be the only honourable place for them.

The smallest sector of the economy, the secondary, contained only 95,923 or 7.3 per cent of all occupied persons. Of this, textile and tailoring employees represented about one third; oil and light manufactures accounted for a quarter; the rest was mainly in building and construction, carpentry, leather and leather goods, public utilities and some light chemicals, etc. The relative importance of women engaged in industry was even less than in agriculture. This is partly due to the prevailing social attitude, but also partly due to the nature and demand for tertiary occupations.

The tertiary sector occupies in the economy of Iraq, as it does in all countries developing from primary to secondary stage of production, the second largest proportion of active population. The tertiary sector, which consists of commerce, public and domestic services, transport and all other administrative and professional services, in that order of importance, represents 470,979, or 35 per cent of all registered occupied population. The proportion of women engaged in this sector is 1.9 per cent of the total national labour force. This is greater than its counterpart in the secondary, but smaller than that of the primary, sector.

Table VI, therefore, shows that the primary or agricultural sector of the Iraqi economy is the largest, the secondary or industrial sector is the smallest, while the tertiary or commercial sector is in between.

This conclusion holds good for all the regions. But it is important, nevertheless, to note the regional variations in the occupational distribution. While the Southern and Northern regions account for 29.6 per cent and 28.3 per cent of all occupations, the Central region is responsible for as much as 42.1 per cent. Further, the tertiary or commercial and secondary or industrial employment in the Central region is almost as much as the total in both the Southern and Northern regions. In other words, while the secondary and tertiary sectors represent about one half to two thirds of the primary sector in the Southern and Northern regions, other sectors combined are greater than the primary sector in the Central region.

It is interesting to compare the results of Tables V and VI, which were calculated from the 1947 Census of Population. According to Table V, the number of people of working age amounted to 2.2 millions; while the occupied population, as shown by Table VI, did not exceed 1.3 million. Before drawing any conclusion from these figures, they must be qualified in several respects. In general, not all the active population is actually available for employment, as it includes the sick and the disabled, the students and the Armed Forces, and a substantial proportion of women. Nor is all the occupied population actually employed, as the definition of ' occupation ' adopted in the 1947 Census is so loose as to include all those belonging to an industry. More specifically, while child labour below the age of 10 and the labour of those aged 50 and above is included in the figure of occupied population, they are excluded by definition from the active population. Bearing these qualifications in mind, one could only suggest, rather tentatively, that the gross ratio of occupied to active population is very low.

## IV

Before drawing the main conclusions, I should like to state my opinion that the sources I have used can, of their nature, only yield estimates which are capable of showing the broad generation-by-generation changes in the size and structure of Iraq's population. On the whole, my estimates of absolute growth are more reliable than my estimates of differences in rates of increase. The weakest estimates are, of course, those of the nomadic population.

In general, one may observe that the growth and structure of Iraq's population during the period 1867–1947 seems to reflect the trend and stages in its course of economic development. The introduction of European sea and river transport ushered in the decline of tribal population, and the fall of the ' mediaeval ' Middle Eastern caravan trade. This contributed to the rise of the rural population, and the expansion of Iraqi-European-cum-Indian export trade. While this increase in foreign trade added to the commercial part of the urban population, the consequent rise in the European imports destroyed the local handicraft industries and thus helped to keep the urban population relatively constant till the early 1930's. The more recent growth of foreign oil investment and the rise of some consumers' goods industries is accompanied by the relative rise of urban and fall of rural population.

More specifically, however, one may point out four major conclusions:

1. The general growth of Iraq's population seems to have passed through three phases of development: one phase of rapid growth, 1867–1905, during which population rose from 1.25 to 2.25 millions, growing at an average rate of between 1.3–1.8 per cent per annum; another phase of slackening growth, 1905–1935, during which population increased to 3.6 millions, at an average rate of between 1.7–1.5 per cent per annum; and finally a phase of more rapid growth, 1935–1947, during which population rose to 4.8 millions, at an average rate of 2.4 per cent per annum. At this more rapid rate of growth, Iraq may double its present population by 1980.

2. The long-term change in the social composition of Iraq's population tends to fall into two stages: in the first stage, 1867–1930, the absolute and relative decline of the tribal population, from under half to under a quarter of a million, or from 35 per cent to 7 per cent of Iraq's population, was accompanied by an equally sharp rise in the absolute level and relative magnitude of the rural population, from just over half a million to nearly two and a

quarter millions, or from 41 to 68 per cent of total population, while the urban component of the population remained virtually constant at 25 per cent of total population. The second stage, 1930–1947, shows that the urban population (which originally was about one-third of a million in 1867), rose absolutely from just over three quarters of a million in 1930 to over a million and three quarters, and relatively from the original 25 per cent to 38 per cent in 1947, while the relative importance of the rural population declined to 57 per cent. This difference is no doubt largely due to rural exodus.

3. The most striking feature of the present structure of Iraq's population is, perhaps, the high ratio of dependent to active population: 2.3 to 2.2 millions. On the average, therefore, each person of working age has another who is economically inactive either because he is too young or too old to contribute to production. Iraq's active population constitutes only 49.5 per cent of the total. It is lower than that of Egypt, where it is 61 per cent according to the 1947 Egyptian Census of population. The high ratio of the dependent population requires the fullest and most productive employment of the economically active population.

4. But, as it appears from comparing Tables V and VI, the ratio of the occupied to active population is very low: 1.3 to 2.2 millions. Thus, the gross estimate of the unemployed and underemployed population constitutes about 40 per cent of the total active population. The employment of this large supply of potential labour force is an essential factor in the process of economic development in Iraq.

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## APPENDIX ON STATISTICAL SOURCES AND METHODS

1. Iraq's boundaries, as established after the First World War, are considered in this paper to be the standard in accordance with which earlier boundaries were, if and when necessary, adjusted. The whole of the Wilayets (provinces) of Baghdad and Mosul have been included; the Najd part of the Wilayet of Basra has been excluded.

2. The present regional divisions are also taken as the standard, i.e. the Northern region or the former Wilayet of Mosul includes the Liwas of Arbil, Kirkuk, Mosul and Sulaimaniyah. The Central region, or the former Wilayet of Baghdad includes the Liwas of Baghdad, Diyala, Dulaim, Hillah, Kerbella and Kut. The Southern region or the former Wilayet of Basra includes the Liwas of Amarah, Basra, Diwaniyah and Muntafiq. It must be noted, however, that in 1890 Hillah included Diwaniyah, and so the latter was excluded from the Central and included in the Southern region.

3. The term ' nomadic population ' is used here to cover that part of the population which roams about in an almost unlimited area, depending almost entirely on the camel for its livelihood, and thus remaining virtually wholly outside the main sectors of the national economy. On the other hand,

all those who have been engaged in pasture or agriculture are included in the rural population. Urban population is defined to include all those living in towns with more than 5,000 inhabitants.

4. The estimate of the population of Iraq in 1866–67 is based, in the main, on the information available in the British Consular Reports on the Trade of Baghdad and Basrah, as published in the British Parliamentary Papers, 1867, LXVII, pp. 266–7. These estimates were prepared by the exceptionally able Consul-General, Sir A. B. Kambell, during his thirteen years of residence in the country. He probably had access to the earlier but incomplete estimates of the population of the tribes made by M. B. Al-Tamimi for the British Resident at Baghdad, Mr. C. J. Rich, about 1818, and also to Captain Chesney's estimates published in The Euphrates Expedition of the 1830's.

Kambell's estimates of Iraq's population explicitly exclude the eyalets (districts) of Mosul and Sulaimaniyah, but include that of Kirkuk. In order to fill in this gap the present writer calculated the population of the eyalets of Mosul and Sulaimaniyah thus: the population of these two eyalets for 1890 is known, while that of Kirkuk (the other district in the Northern region) is known for both 1867 and 1890. The average annual rate of growth of Kirkuk's population between 1867 and 1890 was calculated. As there is no reason why the population of the eyalets of Mosul and Sulaimaniyah should grow at an average rate significantly different from that of Kirkuk, the population of the two eyalets for 1867 was derived from their known population in 1890 minus their estimated growth since 1867.

Moreover, although Sir A. B. Kambell gives the urban population and the agricultural population separately, he combines the nomadic and pastoral population. In order to obtain the rural (agricultural plus pastoral) population, we must separate the nomadic from the pastoral population. A rough estimate of the pastoral population can be derived from the known settled agricultural population by assuming that the ratio of agricultural to pastoral population was more or less the same as the ratio of agricultural to pastoral exports. Subtraction of this estimate from Kambell's figure of the combined nomadic and pastoral population gives an admittedly precarious estimate of the nomadic population. Addition of this estimated pastoral population to the known agricultural population yields an estimate of the rural population. (It is clear that this method of calculation may underestimate the agricultural and over-estimate the pastoral population, as agriculture requires relatively more peasants than pasture requires shepherds per unit of exports. On the other hand, a greater share of agricultural produce was exported than of pastoral produce because of the relatively greater accessibility of the agricultural produce to export markets, which implies a bias in the other direction. But of course these two biases need not cancel out).

5. The 1890 population of Iraq was taken with only very slight adjustment (i.e., the exclusion of Najd and the inclusion of Diwaniyah in the Southern instead of the Central region) from M. Vital Cuinet's work *La*

*Turquie d'Asie* (4 volumes), Paris, 1892, particularly vol. II, pp. 764–5 and vol. III, pp. 119–148, p. 151 and p. 221. M. Cuinet says that his information was supplied by the Department of Census, which carried out a census of population for the Ottoman Empire. The present writer has been unable to see the original Census.

6. The estimate of the population of Iraq in 1905 is based on the British Consular estimates as given in the *Handbook of Mesopotamia*, published by the Admiralty Naval Intelligence Service (London, 1918) which covers the period 1900–1908. See in particular vol. I, pp. 87–94. The nomadic population was there stated to be between 15 and 20 per cent: the present writer has put it at 17 per cent.

7. The estimate of the population of Iraq in 1919 is based on the British Political Officers' estimates given in their district reports on the *Administration of Mesopotamia. 1918-1923* These estimates are more detailed as the country was divided into a relatively large number of divisions. Urban population was estimated from an enumeration of households; rural population was estimated from the collection of taxes on agricultural produce and animals, nomadic population is thus estimated as a residual item.

8. The estimate of the population of Iraq in 1934–35 is that made by the Government of Iraq as a result of enumeration of households and published in the Iraq Directory of 1936. The estimate for 1930 is taken from H. Dowson, *Land Tenure in Iraq*, p. 12.

9. Table III was derived from the Iraqi Ministry of Economics, *Abstract of Statistics*, 1939, p. 7, and from the Public Health Directorate, *Vital Statistics*, 1935, p. 54.

10. The estimate of the population of Iraq in 1947 is taken from the *Report on the Census of Population* of that year (the first census of a modern type), published in three volumes in 1955, one for each of the three regions. The Census excluded the nomadic population, though an estimate of the latter was made by the Department of Census. But it is nevertheless the best source so far available: the estimates in the United Nations Demographic Year Books for the period 1948–55 are bound to be less reliable. For an excellent appraisal of the Census, see Dr. Doris Adams, *Current population problems of Iraq* in the Middle East Journal, Spring 1956.

11. Tables V and VI were derived from the *Report on the Census of 1947*. It is worth noticing that while the number of active males is put at 1.0 million, occupied males are estimated to number 1.2 million. The discrepancy is due in part to the exclusion of both child labour and workers more than 49 years old, and in part to the downward bias in the census returns for the age groups between 15 and 30 years of age springing from the fear of conscription. But the high level of underemployment, particularly among the active female population, remains valid.

12. The annual rates of population increase of Table II were calculated by applying a compound rate of growth. Differences in the number of years in the periods of comparison were ignored as insignificant given the nature of the data.

# MIDDLE-CLASS FAMILIES IN FRANCE AND IN ENGLAND

*By* T. SCHULZ

The middle class is difficult to define. It is not a sector of the population enclosed in a self-contained compartment, as economists and sociologists quickly discover when they try to pin it down, and what is ' middle ' when seen from one angle may appear ' upper ' or ' lower ' when contemplated from another. This elusiveness is fundamental, and the difficulties of definition are multiplied when one is dealing not merely with people in one country but with those belonging to different countries. Nevertheless, there are certain aspects of social, economic, and intellectual status which the layman unhesitatingly labels ' middle class ', and in the following we shall adopt the layman's somewhat vague but serviceable concept and consider the family structure and incomes of groups of families, thus loosely defined, in France and in England.

The first part of this article compares the size of certain middle-class families in the two countries. Our comparisons are based on figures derived from the birth announcements in two newspapers, *viz.*, *Le Figaro* and *The Times*. The readers of these two papers are unlikely to represent *identical* cross sections of the populations of, respectively, France and England; but the majority of them belong undoubtedly to what in their country is generally recognized as ' middle class '. In the second part of our article we shall be concerned with the impact of direct taxation and family allowances on spendable incomes in accordance with the size of the family.

## PART I: THE SIZE OF MIDDLE-CLASS FAMILIES

For the purpose of this article, use has been made of figures obtained from birth announcements in *Le Figaro* and *The Times* during a period of sixteen months, from February 1956 to May 1957. Inevitably, information thus obtained of the structure of families, can only be partial, for various reasons. First, only a fraction of the families that subscribe to a paper also publish in it the births of their children. Secondly, many of the families represented by the birth announcements make in these announcements no reference to children born previously—if any. Thirdly, of the families that state the numbers of such children, some will be completed and some uncompleted families, and there is no clue to the final size of these families. But these qualifications apply equally to the readers of *The Times* and of *Le Figaro*, and thus should not materially affect the relative figures, which are our main concern.

The birth announcements were noted daily and the families arranged according to the numbers of living children recorded in each announcement.[1]

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[1] In the birth announcements in *Le Figaro* the death of a child is stated not only in the case of new-born children but is mentioned in all announcements that give the names of the children born previously (*e.g.*, ' Claude, Aimée—au ciel—et André ont la joie de faire part de la naissance de . . .').

TABLE I

*Announcements of Births (Feb. 1956—May 1957)*

| Period | *The Times* | | *Le Figaro* | |
|---|---|---|---|---|
| | Total | 2 and more Children mentioned: Of Total | Total | 2 and more Children mentioned: Of Total |
| | Numbers | % | Mumbers | % |
| Feb.—May, 1956 ... ... ... | 2,358 | 17.8 | 1,391 | 40.0 |
| June—Sept. 1956 ... ... ... | 2,158 | 15.4 | 1,399 | 39.6 |
| Oct.—Jan. 1956–7 ... ... | 2,006 | 16.1 | 1,360 | 39.4 |
| Feb.—May 1957 ... ... ... | 2,330 | 15.8 | 1,461 | 39.5 |
| Feb. 1956—May 1957 ... ... | 8,852 | 16.3 | 5,611 | 39.7 |

Table I shows the total numbers of announcements registered during these sixteen months and the proportions of families that mentioned two or more children. Only these families can, of course, be reasonably compared with one another, since of the families that limited their information to the announcement of the new-born child, the structure is unknown. In the following the families that can thus be compared will be referred to for short as the families *with* two and more children; this however must not be taken to imply the assumption that all the families that made reference to the new-born child only had no previous children living.

TABLE II

*Families with*[1] *2 and More Children (Feb. 1956—May 1957)*

| Period and Newspaper | 2 & more Children | 2 Children | 3 Children | 4 Children | 5 & more Children |
|---|---|---|---|---|---|
| | % | % | % | % | % |
| *The Times* | | | | | |
| Feb.—May 1956 ... ... | 100.0 | 62.4 | 28.1 | 8.1 | 1.4 |
| June—Sept. 1956 ... ... | 100.0 | 58.6 | 30.8 | 8.8 | 1.8 |
| Oct.—Jan. 1956–7 ... ... | 100.0 | 55.3 | 30.7 | 10.8 | 3.4 |
| Feb.—May 1957 ... ... | 100.0 | 56.2 | 31.0 | 10.9 | 1.9 |
| Feb. 1956—May 1957... ... | 100.0 | 58.3 | 30.0 | 9.6 | 2.1 |
| *Le Figaro* | | | | | |
| Feb.—May 1956 ... ... | 100.0 | 38.9 | 29.4 | 16.4 | 15.3 |
| June—Sept. 1956 ... ... | 100.0 | 37.2 | 27.3 | 16.3 | 19.2 |
| Oct.—Jan. 1956–7 ... ... | 100.0 | 40.1 | 27.1 | 13.1 | 19.7 |
| Feb.—May 1957 ... ... | 100.0 | 40.2 | 25.4 | 16.0 | 18.4 |
| Feb. 1956—May 1957... ... | 100.0 | 39.1 | 27.3 | 15.5 | 18.1 |

[1] *i.e.*, mention was made in the birth announcement of at least one living brother or sister of the new-born child.

The structures of these comparable families with two and more children are given in Table II in percentage figures, relating the proportions of families to the numbers of children. The patterns obtained for the four-monthly sub-groups are remarkably regular and reflect in their essential outlines those of the corresponding totals. They indicate a much smaller proportion of families with more than two children, and a much steeper decline in the numbers of large families, for the readers of *The Times* than for those of *Le Figaro*. The differences in the relative structures appear perhaps even more strikingly in Table III, which sets out the distribution of families and of children per 1,000 families with two and more children. Among those that placed a birth announcement in *The Times*, only 21 in 1,000 families had five and more children, including the new-born (with an average for these families of about 5.3 children per family), while among those that placed an announcement in *Le Figaro*, there were 181 such families in 1,000 families (with an average of about 6 children per family). The average numbers of living children for all the families with two and more children were 2.56 per family for the readers of *The Times* and 3.30 per family for the readers of *Le Figaro*.

TABLE III

*Children per 1,000 Families with*[1] *2 and More Children* (*Feb. 1956—May 1957*)

| | *The Times* | | | *Le Figaro* | | |
|---|---|---|---|---|---|---|
| Families with[1] | Families | Children | | Families | Children | |
| | Numbers[2] | Numbers[2] | % | Numbers[2] | Numbers[2] | % |
| 2 Children... ... | 583 | 1,166 | 45.5 | 391 | 782 | 23.7 |
| 3 Children... ... | 300 | 901 | 35.2 | 273 | 819 | 24.8 |
| 4 Children... ... | 96 | 383 | 14.9 | 155 | 618 | 18.7 |
| 5 Children... ... | 13 | 66 | 2.6 | 87 | 436 | 13.2 |
| 6 Children... ... | 8[3] | 46[3] | 1.8 | 54 | 323 | 9.8 |
| 7 Children... ... | — | — | — | 24 | 167 | 5.1 |
| 8 & more Children | — | — | — | 16 | 154 | 4.7 |
| Total ... | 1,000 | 2,562 | 100.0 | 1,000 | 3,299 | 100.0 |

[1] *Cf.* footnote to Table II.

[2] In round figures.

[3] Including 1 family in 1,462 families with 7 children.

The distribution of children per 1,000 families with two and more children is outlined in continuous juxtaposition in Diagram A. The figures placed along the two curves in the diagrams indicate the minimum number of children per family of the families represented in the section to the left of the respective curve and the maximum number of children per family of those represented in the corresponding section to the right. Logarithmic scales, which compress the field of high figures and dilate that of low ones are employed in this Diagram so as to permit of a clear representation of the relatively small proportions of large and very large families in the two samples.

The data of family structure obtained from the birth announcements in *The Times* and *Le Figaro* fit in curiously well with the data of family structure obtained from the statistics of family allowances paid out in France in 1954 and in the United Kingdom in 1954–55.[1] The statistics of family allowances, too, refer to a mixture of completed and uncompleted families; but they

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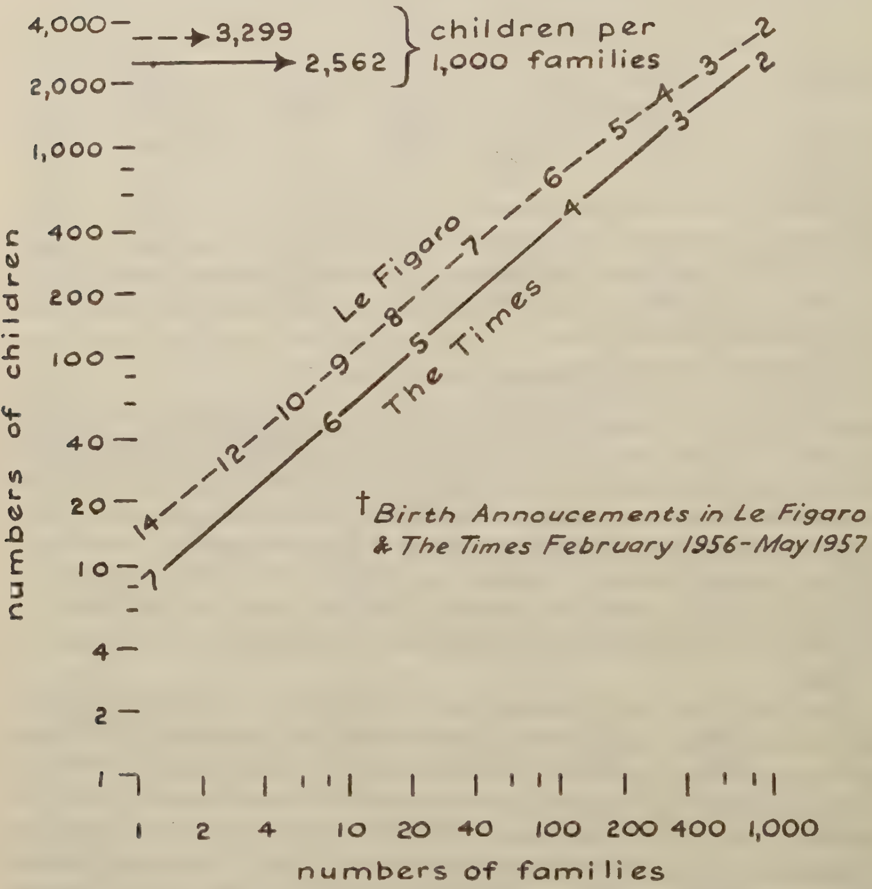
[1] These financial years were chosen because 1954 was the most recent year for which at the time of writing this article complete data for France were available.

DIAGRAM A

Children per 1,000 Families in Families with 2 & more Children†



†Birth Annoucements in Le Figaro & The Times February 1956-May 1957

cover all the families that claimed an allowance, from the family of the casual labourer to that of the highly qualified intellectual, and they further take into account only those children that are still dependent.[1] The figures derived from these statistics are shown in Table IV. Although they are not strictly comparable with the figures obtained afrom the birth announcements, they reveal very similar trends and hence suggest that the data from *Le Figaro* and *The Times* are not mere accidents.

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[1] Against this it can be assumed that in the vast majority of the families that announce a birth in *Le Figaro* or *The Times, all* the children born previously are still dependent.

TABLE IV

*Family Allowances to Families with 2 and More Dependent Children (1954–55)*

| Families with | *United Kingdom* | | | *France* | | |
|---|---|---|---|---|---|---|
| | Families | Children | | Families | Children | |
| | Numbers | Numbers | % | Numbers | Numbers | % |
| 2 Children... ... | 637 | 1,274 | 49.7 | 374 | 748 | 22.5 |
| 3 Children... ... | 233 | 699 | 27.3 | 280 | 840 | 25.3 |
| 4 Children... ... | 83 | 332 | 12.9 | 165 | 660 | 19.9 |
| 5 & more Children | 47 | 259 | 10.1 | 181 | 1,074 | 32.3 |
| Total ... ... | 1,000 | 2,564 | 100.0 | 1,000 | 3,322 | 100.0 |

The differences thus indicated in the structure of French and of English families are remarkable. What is the cause of these differences? There can be no doubt that they are related to a variety of factors—economic, social, possibly also religious and moral—which in France are more favourable to the raising of large families than they are in England. To trace their operation would be a very lengthy and difficult task; to evaluate their respective efficacy might be an impossible one. Our present inquiry moves within narrower limits; we shall here be concerned only with one particular economic factor, *viz.*, the financial position of the large as compared with the small middle-class family in the two countries.

## PART II: FAMILY INCOMES

In Part I our criterion of middle class was readership of a middle-class newspaper. What we now need is a definition in terms of income and we choose, somewhat arbitrarily, a range of net earned incomes[1] of from £600 to £3,000 a year in Britain and from 600,000 francs to 3,000,000 francs in France. It is, of course, the case that the birth announcements in *The Times* are not a true sample drawn from all those who receive incomes between £600 and £3,000 (and similar for *Le Figaro* and French families). There will be readers of *The Times* above and below this range of earnings. Contrariwise, there will be people in this range who are not readers of *The Times* (or an equivalent daily paper) and thus are not ' middle class ' by this kind of test. But it seems reasonable to assume that the middle-class groups, as considered in Part I and Part II of this article, have a substantial membership in common, in both France and Britain, and since our purpose is less to make precise calculations than to indicate the relative impact of income tax and family allowances on the incomes of families of different sizes, this arbitrary choice is defensible.

Again, as our purpose is essentially illustrative it was convenient to fix on income ranges that facilitate arithmetical comparisons of the relative positions of families of different sizes at the various points of the middle-class income scales. We need not therefore be unduly concerned with the question whether the internal purchasing power of £1 sterling is precisely the same as the internal purchasing power of 1,000 francs.[2] It is enough for our purpose

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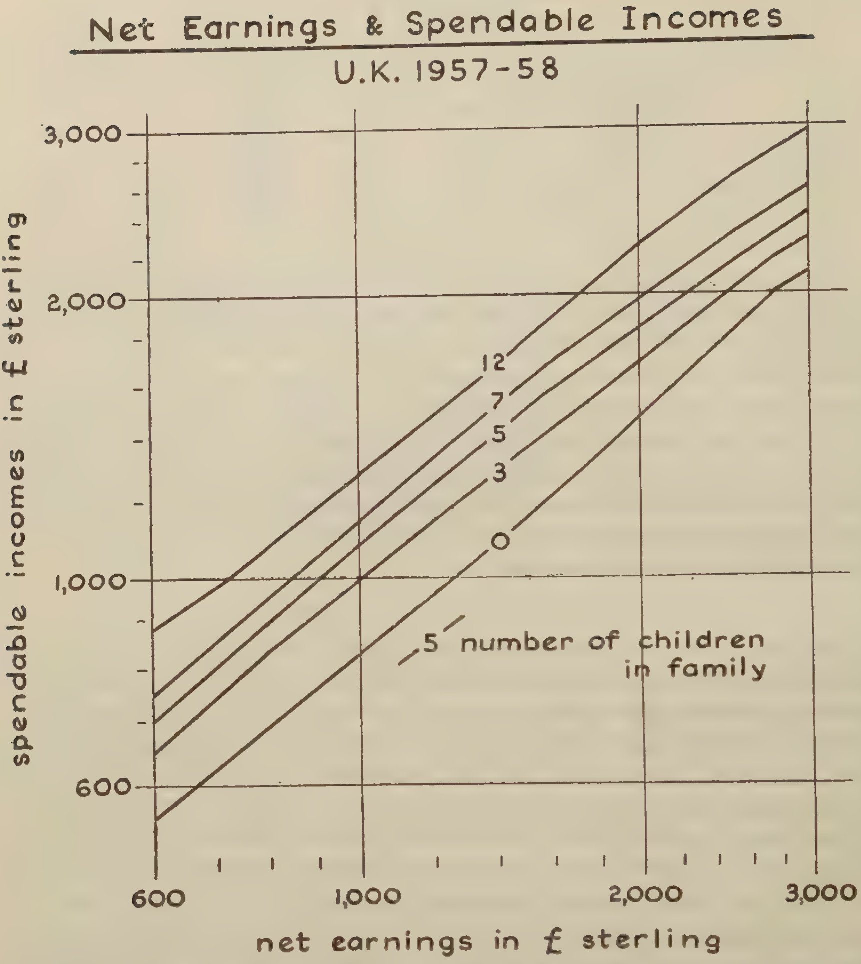
[1] In this paper, ' net earned income ' and ' net earnings ' are always taken to mean the actual earnings minus the contributions to national insurances.

[2] Generally speaking it can be said that 1,000 francs purchased somewhat less consumer goods in France than did £1 in England.

DIAGRAM B



that the bulk of the families of middle-class type in France and in Britain fall within the specified income ranges.[1]

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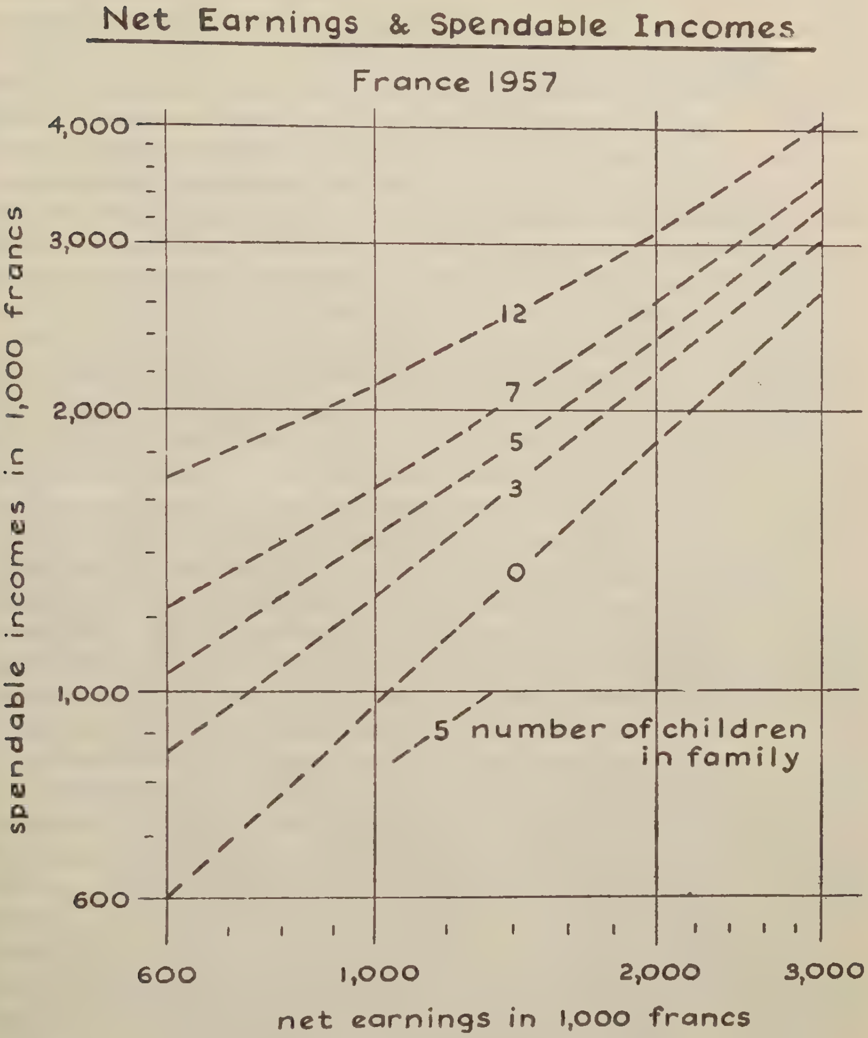
[1] The most recent published figures of annual net earnings in France refer to 1954. In that year, of all male earners—including those in the higher administrative and professional jobs—only 1 per cent obtained *p.a.* 2,000,000 francs and more; 3.6 per cent had between 1,000,000 and 2,000,000 francs; 20.1 per cent had between 500,000 and 1,000,000 francs; 18 per cent had under 250,000 francs. Of the male earners in the higher administrative and professional jobs only, 37.3 per cent earned less than 1,000,000 francs; 44.3 per cent earned between 1,000,000 and 2,000,000 francs; and 18.4 per cent earned 2,000,000 francs and more. No directly comparable figures are available for the United Kingdom; but the distribution of taxable incomes in 1954 was as follows:

| | Married Couples | Single Persons |
|---|---|---|
| | % | % |
| Under £ 250 ... ... ... ... | 5.9 | 28.9 |
| £ 250—£ 500 ... ... ... ... | 40.6 | 54.3 |
| £ 500—£1,000 ... ... ... ... | 45.8 | 14.6 |
| £1,000—£2,000 ... ... ... ... | 5.7 | 1.5 |
| £2,000 and over ... ... ... ... | 2.0 | 0.7 |
| | 100.0 | 100.0 |

DIAGRAM C



Net Earnings & Spendable Incomes

France 1957

Diagrams B and C show the relation between net earnings and spendable incomes for families with no children and with three, five, seven, and twelve children. By ' spendable income ' is understood the net earnings plus family allowances and minus income tax. The graphs are drawn on logarithmic scales, and in order to facilitate their reading, certain levels of earnings and of spendable incomes are indicated by means of lines crossing the Diagrams. In Diagram B these lines mark the levels of £600, £1,000, £2,000, and £3,000, and in Diagram C they mark the levels of 600,000 francs, 1,000,000 francs, 2,000,000 frans, 3,000,000 francs, and 4,000,000 francs. The 4,000 level is required only in Diagram C, representing the French families, with reference to the spendable incomes of large families in the upper ranges of net earnings, of from 1,900,000 francs to 3,000,000 francs.

It will be seen that in the United Kingdom the spendable income approximately equalled the earned income at the £1,000 level, for a family with three children; at the £2,000 level, for a family with seven children; and at the £3,000 level, for a family with 12 children. In France, a family earning 1,000,000 francs and with three dependent children, had a spendable income about 25 per cent above their earned income; a family with seven children and an earned income of 2,000,000 francs, had a spendable income of about 30 per cent above their earned income; and a family with twelve children and an earned income of 3,000,000 francs, had a spendable income not much short of 40 per cent above their earned income.

The pictures represented by these Diagrams are typical for the two countries; they are not, however, complete pictures of the spendable incomes of the respective middle-class groups. For in both England and France rates of taxation and modes of tax assessment differ for incomes derived from different sources and in particular—but not only—for earned and unearned incomes. Furthermore, in France family allowances too vary, in accordance with the type of family income and with the locality in which a family resides. In computing the data for this paper it has been assumed that no family includes more than one earner and that all the taxable income of the familes (excluding family allowances—which in France however are not taxable) derives from earnings. Half of the dependent children of the French families with two or more children have been taken to be under and half over ten years old, while all the children of the English families have been assumed to belong to the age group from eleven to sixteen years.[1] Of the French families it has further been assumed that all the earnings were the reward of employment and not self-employment, that the families lived in Paris or its immediate environment,[2] that the childless families had been married for at least two years, and that in the families with only one child, the child was over five and under ten years old.[3]

In France as well as in the United Kingdom, middle-class earners with dependent children benefit from family allowances and from tax allowances. The French systems of family allowances and of direct taxation are discussed in some detail in *Appendices* 1 and 2. Here it must suffice to indicate some fundamental differences between the allowances in France and in England. Family allowances in France are not only generally higher than in the United Kingdom but they are also adjusted so as to encourage the housewife to stay at home and raise a family; for special grants are provided for families with several children and only one bread winner. Such a grant is also available to a childless couple during the first two years of their marriage and to the family of an employee with only one child, while the child is under ten years of age. These allowances, which are graded regionally and which all remain untaxed, whatever the family income, confer of course the greatest benefit on families with relatively low earnings.

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[1] These assumptions were made in order to obtain smooth series of figures, even though they imply manifest absurdities, in the case of French families, when the numbers of children are odd, and in the case of British families, when the numbers of children are large.

[2] In this region, the scale of family allowance is the highest. However, in important industrial districts the allowances fall short by only ¾ of 1 per cent of those obtaining in greater Paris.

[3] Families with one child obtained an allowance only if there was only one earner and the child under ten years old. The allowance for an only child aged between five and ten years was half the amount given for an only child under five years of age.

French direct taxation, on the other hand, makes considerable concessions to the families with dependent children in the higher income ranges, since for all families paying direct taxes, the tax burden eases *in proportion* to the size of the family. For the purpose of assessment to direct taxation, husband and wife are in France counted each as one unit, while to each dependent child is allotted the value of half a unit. The total taxable income of the family is then divided as though the family consisted of the computed number of independent income units, and the scale of taxes applied separately to each unit. The French system of taxation thus treats each child as an integral part of the family, with a claim to its fixed proportional share in the earned income.

United Kingdom taxation treats dependent children very differently. In the United Kingdom, £100, £125, or £150 of the family income are exempt from taxation, dependent on the child's age.[1] Thus the amount of tax remission per child can never surpass the amount of income tax and surtax on a marginal £150 *p.a.* Moreover, all family allowances obtained in the United Kingdom are included in the taxable income and assessed at the marginal rate—liable therefore not only to income tax but also, when applicable, surtax.[2]

A comparison of the curves in Diagram B with those in Diagram C shows that a large French family, even with a ' high ' middle-class income, is considerably better off than an approximately comparable United Kingdom family, in relation to the corresponding small family with the same net earnings. For families on the low fringes of net earnings represented in the Diagrams these differences between the relative spendable incomes of French and of English families are truly phenomenal. It is however also worth noting that within the income ranges here considered even the family of two persons is taxed more heavily in the United Kingdom than in France.

The differences in the relation of spendable incomes to net earnings in the two countries are brought out even more distinctly in Diagrams D and E. In these Diagrams the spendable incomes of families with no children, with one child, and with from two to twelve children are expressed as percentages of their respective net earnings. These percentages are measured vertically along logarithmic scales; the horizontal base lines in the Diagrams indicate

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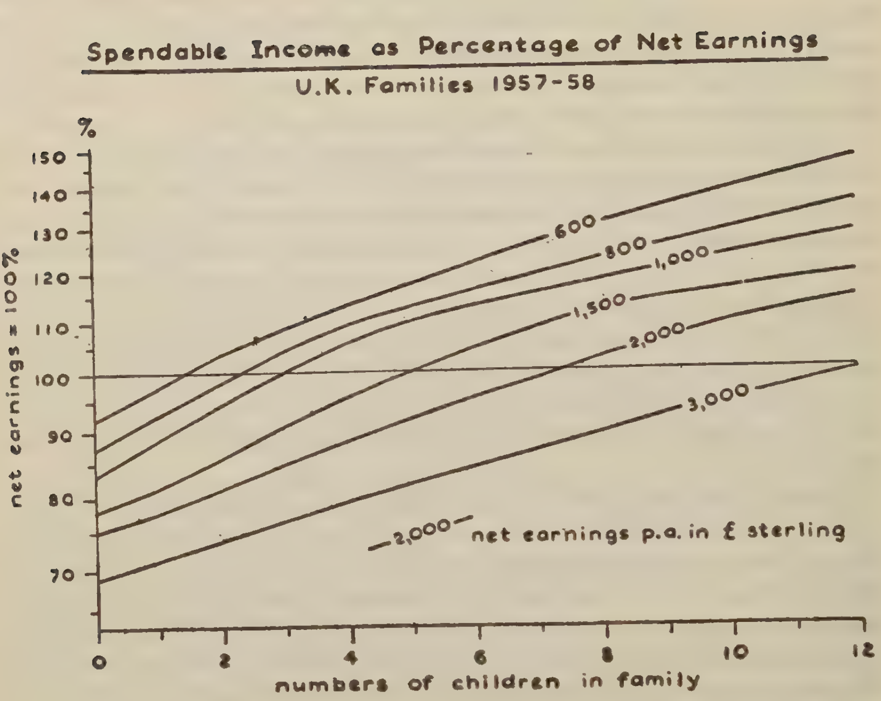
[1] For children aged, respectively, under 11 years, between 11 and 16 years, and over 16 years. This grading was introduced in 1957. Previously the income exempt from taxation was £100 per dependent child, irrespective of the child's age.

[2] No family with children and an earned income of up to £3,000 was, however, liable to surtax in 1957–58.

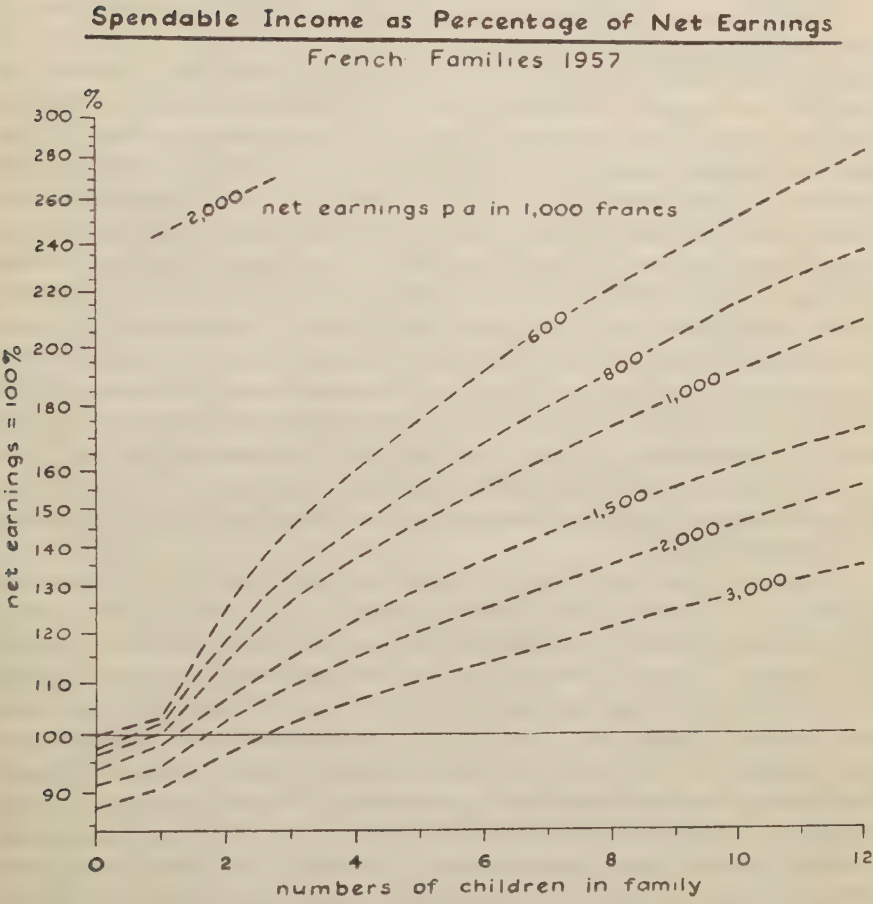
## DIAGRAM D



the numbers of children. The lines running parallel to the base lines and cutting the percentage scales at 100, mark the points at which a spendable income equals the net earnings from which it derives. The figures of actual net earnings represented in the Diagrams are inscribed in the curves to which they relate. The kinks in the curves of Diagram D, which give to the Diagram a somewhat irregular appearance, indicate the decline in the marginal rates of the tax scale for the larger families; owing to the limitation in tax allowances for dependent children in the United Kingdom, the incidence of this decline diminishes to the vanishing point for families in the higher ranges of earnings.

The curves in Diagram E, representing French family incomes, fan out smoothly from the points indicating the incomes of families with one child. The relatively small family allowance to the one-child family with one earner is reflected in the initial break of the curves, which is most noticeable in

DIAGRAM E



relation to the families with low earnings. As the proportion of spendable income represented by the family allowance declines and the effect of the system of fractional taxation in accordance with the number of family units increases, this break softens distinctly, and the curve relating to families with net earnings of 3,000,000 francs *p.a.* appears as an almost smooth line throughout its whole length. In general, however, Diagram E demonstrates very neatly the fact that the financial relief to French families with children is conceived as an instrument not merely of social justice but of a comprehensive population policy. Hence the relatively small and restricted allowance for the one-child family; hence the generous tax relief for larger families in the upper income groups; hence also the allowance to a married couple without a child and only one earner during the first two years of marriage.

Table V sets out the percentage increases of spendable incomes for marginal children—the first, second, third, fifth, seventh, and twelfth child—at different levels of net earnings. In each instance the spendable income of the family of two persons in taken as 100. These same base figures of 100 per cent also apply to the percentage figures in the penultimate column, which relate to the total spendable incomes of families with twelve children. They represent, at the different levels of net earnings, the spendable income of the family of two persons plus the total of the appropriate additions for each successive child, from the first to the twelfth. The figures in the last column of Table V, computed from these same figures of total spendable incomes of families with twelve children, have as their base the corresponding figures of net earnings, which are given in the first column. The juxtaposition in the last two columns of figures of identical spendable incomes with reference, on the one hand, to the spendable incomes of families of two persons and on the other, to net earnings, helps to throw into relief the main data in the Table, since it defines the relation between earnings and incomes. The figures in the last column of Table V are represented in the terminal points of the curves in Diagrams D and E.

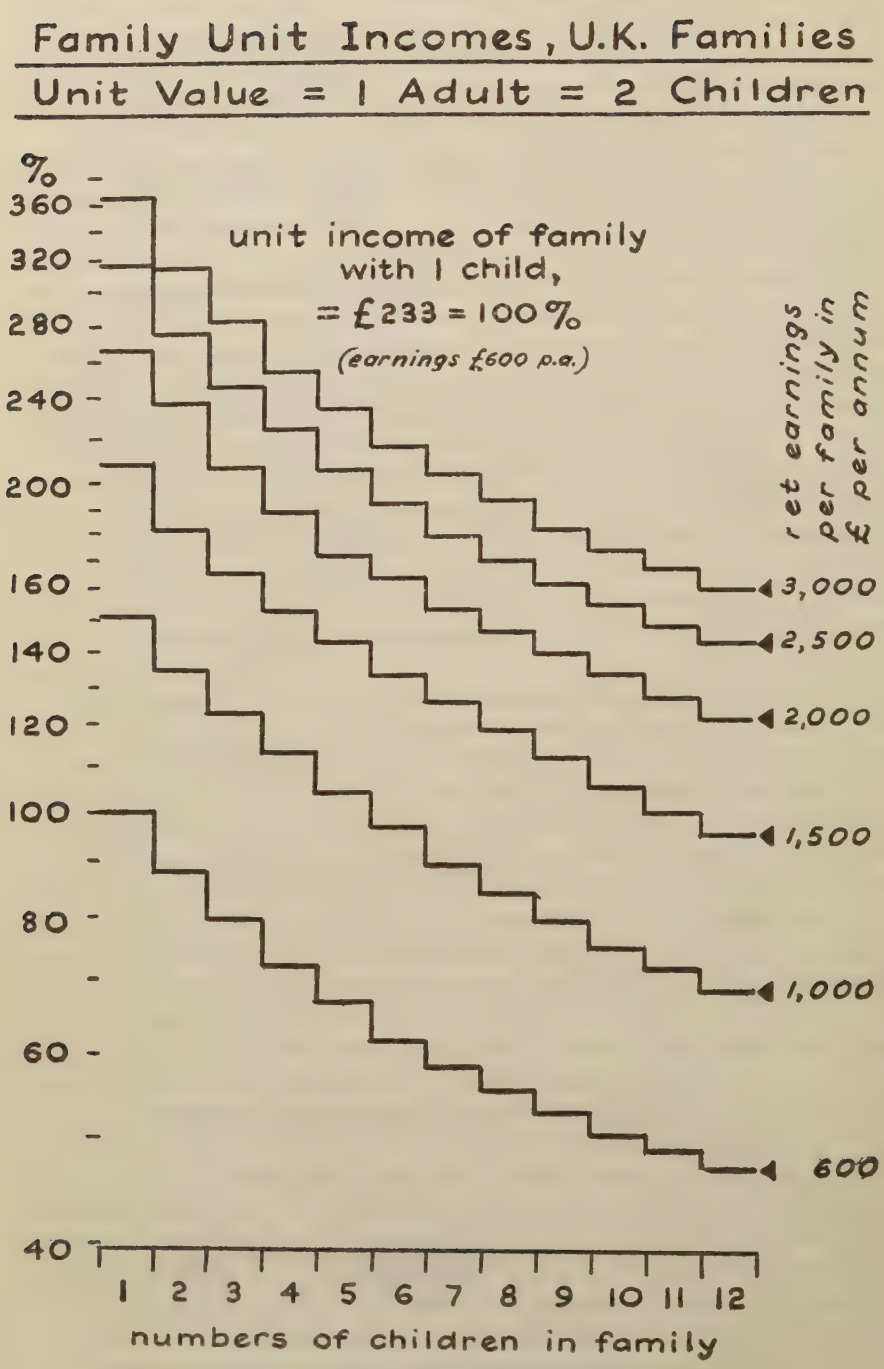
The figures in Table V show, in relative terms, the ‘ price ’ set by the Exchequer on children in the different income groups. What is the ‘ price ’ paid for the children by the families? An answer to this question is outlined in Diagrams F and G, for British and French families, at six different levels of net earnings, between £600 and £3,000, and 600,000 francs and 3,000,000 francs *p.a.* The data of spendable family incomes have been divided for the purpose of these Diagrams by the numbers of family units as computed in France for the assessment for direct taxation, *i.e.*, each adult is counted as a unit and each child as half a unit. Since the concept of a ‘ normal ’ family implies the presence of children, and since middle-class earnings are *ex hypothesi* of a magnitude to maintain a family with one or several children, we have here disregarded the childless family and, instead, taken as our bases of comparison the unit incomes of families with one child and net earnings of, respectively, £600 and 600,000 francs *p.a.* For United Kingdom families with one child and £600 *p.a.*, the spendable income per family unit amounted to £233; for French families with one child and 600,000 francs *p.a.*, the spendable income per family unit was 248,000 francs. These figures of £233 and 248,000 francs have been equated to 100 and used as bases for the percentage figures represented in Diagrams F and G. In these Diagrams the percentages are measured along the logarithmic vertical scales, while the numbers of children in the families are shown along the horizontal scales. In the right hand margin of each Diagram are given

### TABLE V

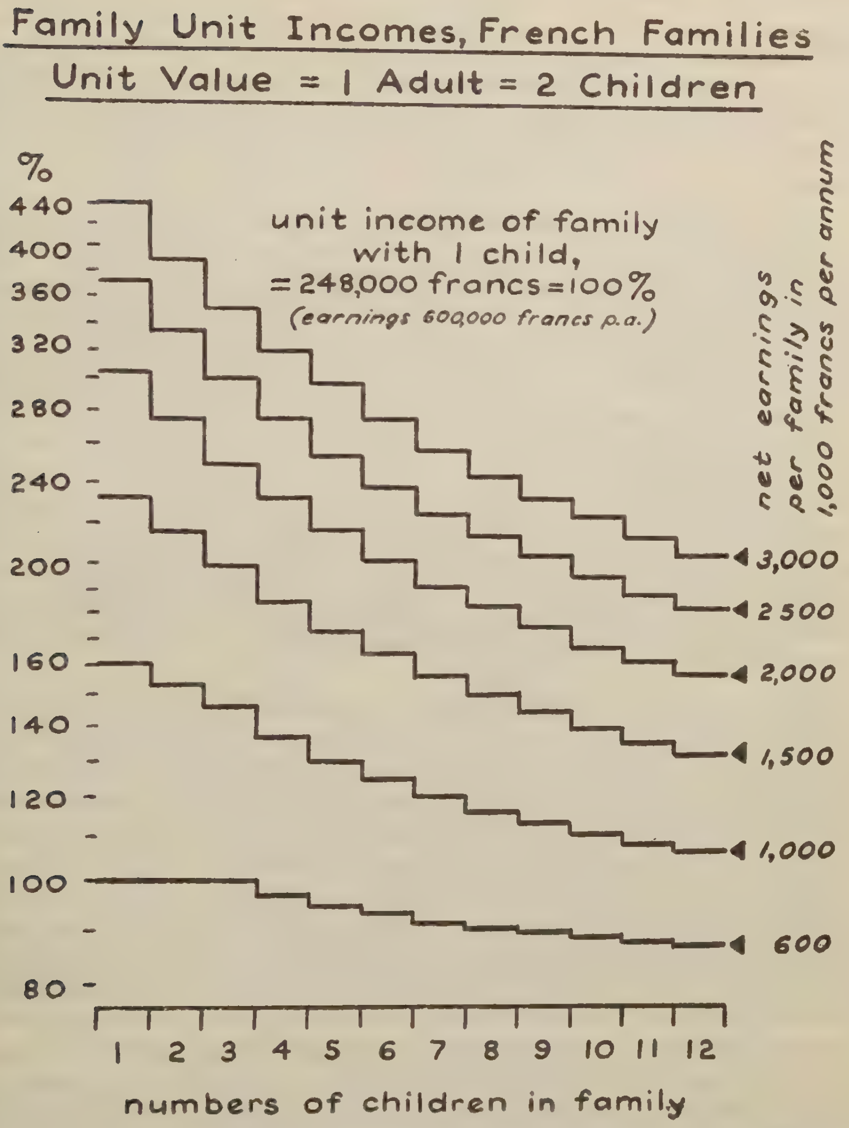
*Increase in Spendable Incomes Through Total Allowances for Children*

| Net Earnings | Spendable Income of Families with no Children | Percentage Increase of Spendable Incomes of Family with no Children for Marginal | | | | | | | Total Spendable Income of Family with 12 Children as % of | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 1st Child | 2nd Child | 3rd Child | 5th Child | 7th Child | 9th Child | 12th Child | Spendable Income of Family with no Children = 100% | Net Earnings =100% |
| £ | % | % | % | % | % | % | % | % | % | % |
| 600 ... | 100 | 6 | 7 | 5 | 5 | 5 | 5 | 5 | 160 | 147 |
| 800 ... | 100 | 6 | 7 | 7 | 4 | 4 | 4 | 4 | 155 | 135 |
| 1,000 ... | 100 | 6 | 8 | 7 | 5 | 3 | 3 | 3 | 154 | 128 |
| 1,500 ... | 100 | 5 | 6 | 6 | 6 | 5 | 3 | 2 | 153 | 119 |
| 2,000 ... | 100 | 4 | 5 | 5 | 5 | 5 | 4 | 3 | 152 | 114 |
| 2,500 ... | 100 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 148 | 106 |
| 3,000 ... | 100 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 145 | 100 |
| 1000 Francs | % | % | % | % | % | % | % | % | % | % |
| 600 ... | 100 | 4 | 22 | 19 | 16 | 16 | 16 | 16 | 285 | 285 |
| 800 ... | 100 | 5 | 17 | 15 | 12 | 12 | 12 | 12 | 244 | 239 |
| 1,000 ... | 100 | 4 | 15 | 13 | 10 | 10 | 10 | 10 | 219 | 211 |
| 1,500 ... | 100 | 3 | 12 | 9 | 8 | 7 | 7 | 7 | 186 | 174 |
| 2,000 ... | 100 | 3 | 9 | 7 | 6 | 6 | 6 | 5 | 170 | 156 |
| 2,500 ... | 100 | 3 | 7 | 6 | 5 | 5 | 5 | 5 | 160 | 144 |
| 3,000 ... | 100 | 4 | 7 | 6 | 4 | 4 | 4 | 4 | 154 | 135 |

DIAGRAM F


Family Unit Incomes, U.K. Families
Unit Value = 1 Adult = 2 Children
%
360
320
280
240
200
160
140
120
100
80
60
40
unit income of family with 1 child, = £233 = 100%
(earnings £600 p.a.)
net earnings per family in £ per annum
3,000
2,500
2,000
1,500
1,000
600
1
2
3
4
5
6
7
8
9
10
11
12
numbers of children in family

## DIAGRAM G



the figures of family net earnings related to the percentage curves of spendable unit incomes.

Diagrams F and G tell their stories very plainly. In the United Kingdom, the family with net earnings of £3,000 *p.a.* that aspired to twelve children, must be prepared to accept the living standard attained by a family with earnings of £1,500 *p.a.* and three children, or of a family with earnings of £2,000 and six children, or a family with earnings of £2,500 and nine children.

The relative position is fairly similar in France for families of the same sizes and with net earnings of, respectively, 3,000,000 francs, 2,500,000 francs, 2,000,000 francs, and 1,500,000 francs. But while in the United Kingdom the spendable income per family unit of these families with three, six, nine, and twelve children amounted to about 1.6 times of that of a family with one child and £600 net earnings *p.a.*, the French families disposed of unit incomes about double that of the family with one child and net earnings of 600,000 francs.

If the unit income of families with twelve children in these higher groups of net earnings is compared with the unit income of the one-child family in the same groups, we find that it declined for the United Kingdom families with net earnings of £3,000, by 56 per cent; when the earnings amount to £2,500, the decline was 55 per cent; when they amounted to £2,000 or £1,500, the decline was about 54 per cent. For French families we obtain the following figures—again giving the unit income of the one-child family with the same net earnings the value of 100 per cent: a decline of 53 per cent, for net earnings of 3,000,000 francs; of 51 per cent, for earnings of 2,500,000 francs; of 48 per cent, for earnings of 2,000,000 francs; and of 44 per cent, for earnings of 1,500,000 francs. Turning to the lowest end of our ranges of net earnings, *viz.*, £600 and 600,000 francs *p.a.*, and again equating the unit income of the one-child family with 100 per cent, we find for the family with twelve children a decline per unit income in France of 14 per cent and in the United Kingdom by 53 per cent.

It is impossible to generalize on what ' ought ' to be the unit income for a family above the poverty level. The middle-class couple that chooses a large family in preference to, say, a motor car and expensive holidays, is not sacrificing happiness. Yet such a couple might still deny themselves the children they want and decide that the apparent luxury expenses are more important, if they expect by these means to enhance the breadwinner's professional prospects. Even when it is not a matter of advancement but merely of maintaining the family's social status, the question, ' how many children can we afford to have, how many can we afford to educate adequately?' will have to be faced. Obviously, the maintenance of their social status will be achieved by different types of families, identically placed, at different levels of unit expenditure, dependent largely on adaptability and skill of management; but there are limits to the possible economies that are practicable within a given social environment. The picture presented by Diagrams F and G certainly suggests that the cost of ' another ' child places a less strain on French than on British middle-class families.[1]

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[1] It may be of interest to compare the actual income per child of a well-to-do United Kingdom family with the expenditure per child on children in the care of public authorities. In 1957–58, a United Kingdom family with earnings of £3,000 *p.a.* and one child had available for this child, in terms of unit income £427; a family with the same earnings and twelve children had per child, £187. In 1957, the London County Council paid for the seven children of a destitute family, permanently in its care, a total of £3,050—or, per child *p.a.*, £436. In 1956–57, the cost of maintaining a child in an approved school averaged for the whole country £470 *p.a.*

## CONCLUSION

The preceding pages have brought to light marked differences in the structure and the income of certain French and English middle-class families. In France, the very large middle-class family appeared to be not uncommon; in England it is almost non-existent. Data obtained from birth announcements in *Le Figaro* showed that of 2,225 families that in addition to the new-born had at least one older child, 4 per cent had between seven and fourteen children, with an average for these 4 per cent, of eight children per family. Birth announcements in *The Times* during the same period, also only of those families—1,442 in number—that in the announcement mentioned at least one older child, never indicated more than seven children in a family, and that only in one instance. Of the 2,225 French families, 5.4 per cent had six and 8.7 per cent five children; of the 1,442 English families, 0.7 per cent had six children and 1.3 per cent five.

We also examined the allowances—in the form of tax reductions and family allowances—available in France and in the United Kingdom to middle-class earners for their dependent children. We found that the large middle-class family as compared with the small family having the same net earnings, was in a more favourable financial position in France than in England. This applied to the whole ranges of earnings considered by us, from £600 to £3,000 *p.a.* in England and from 600,000 francs to 3,000,000 francs in France; but it was particularly noticeable with respect to the lower and middle incomes in these ranges.

One must however beware of concluding from this that the relatively easier financial position of large families in France is the main *cause* of the existence of such families in France. The most that can safely be assumed is that it makes such families possible. Our figures of standardized spendable incomes have made it abundantly clear that for practically all middle-class earners in France as well as in England, the spendable income per consumption unit decreases with each increase in the number of children. Thus even in France the large family is likely to materialize only if a couple derives greater satisfaction from expenditure on children than from expenditure on amenities.

## APPENDIX 1: FRENCH FAMILY ALLOWANCES

The allowances with which we are concerned in this paper are twofold: first, the ' allocation de salaire unique ' and secondly, the ' allocation familiale' proper. The ' allocation de salaire unique ' can be obtained when there is only one earner in the family. The ' allocations familiales ' are allowances given on a per head basis for dependent children. Both these ' allocations ' are computed in relation to assumed basic earnings, the base for the ' allocation de salaire unique ' being 17,250 francs per month and that for the ' allocations familiales ' 18,000 francs. Thus the ' allocations ' made to a family with only one earner and dependent children are always calculated, for the same family, with reference to two different bases. The 100 per cent base figures apply to Paris and its immediate environment; it is diminished by from 0.75 to 15 per cent, according to the geographic region.

The 'allocations de salaire unique' are available only to dependent workers and employees.[1] The main qualifying conditions for this 'allocation' are: there must be only one earner in the family[2] and there must be dependent children, except in the case of a couple married for less than two years. If there is only one child, it must be under ten years of age. A childless couple with only one earner can obtain an allowance of 10 per cent of the basic salary appropriate to the region, during the first two years of their marriage. An allowance of the same magnitude is obtained by a family with only one child, while the child is between five and ten years old. Up to the age of five years, the allowance is double this amount, and if a family had several children and only one remains dependent, the allowance for this last child is also 20 per cent of the basic salary, irrespective of the child's age. For families with two dependent children, the total allowance is raised to 40 per cent of the basic salary, and for families with three and more children, to 50 per cent. The amount of 50 per cent is the maximum obtainable as 'allocation de salaire unique'.

Families with more than one dependent child are besides entitled to 'allocations familiales', provided the main income of the family is represented by earnings, unless the potential earner is certified to be unable to work. These 'allocations familiales' are however substantially higher for earners working for an employer than for the self-employed. All earners are entitled to the following 'allocations familiales': For two children, 22 per cent of the basic salary and a further 33 per cent for every additional child. Thus a family with twelve children obtained ten times 33 per cent plus 22 per cent, *i.e.*, 352 per cent of the basic salary. Another 5 per cent was added for every child over ten years old, except the first. An additional allowance was available for all earners not self-employed, amounting to 935 francs per month for the second child and to 1,438 francs for each subsequent child. For a family with twelve children, this added up to a monthly total of 15,315 francs. The family allowances available to families of different types and structure are summarized in Table 1.

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[1] A related allowance—'allocation de la mère au foyer'—can be obtained by farmers and rural artisans, when there are at least three dependent children in the family. In the case of three children, it amounts to 15 per cent of the basic salary for the region; in the case of four children, it is 25 per cent; in the case of five children, it is 40 per cent; in the case of six and more children, 50 per cent.

[2] More correctly: *one income* and that an earned income. An earner drawing two incomes is not entitled to the 'allocation de salaire unique'; but there are certain exceptions to this in cases where the second income is small.

TABLE 1

| Independent Children | | Averages per Child per Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | Wage and Salary Earners | | | | Independent Earners | |
| | | 1 Earner | | Husband and Wife Earners | | | |
| No. in Family | Ages | Max.[1] | Min.[2] | Max. | Min. | Max. | Min. |
| | Years | 1,000 frs. | 1,000 frs. | 1,000 frs. | 1,000 frs. | 1,000 frs. | 1,000 frs. |
| 1 | 0— 5 | 41 | 35 | nil | nil | nil | nil |
| 1 | 5—10 | 21 | 18 | nil | nil | nil | nil |
| 1 | over 10 | nil | nil | nil | nil | nil | nil |
| 2 | under 10 | 71 | 61 | 30 | 26 | 24 | 20 |
| 2 | 1 over 10 | 76 | 66 | 35 | 31 | 29 | 25 |
| 3 | under 10 | 84 | 73 | 49 | 44 | 40 | 34 |
| 3 | 1 over 10 | 87 | 76 | 52 | 47 | 43 | 37 |
| 4 | under 10 | 85 | 74 | 59 | 52 | 48 | 40 |
| 4 | 2 over 10 | 90 | 78 | 64 | 56 | 53 | 45 |
| 6 | 3 over 10 | 92 | 80 | 75 | 65 | 60 | 52 |
| 8 | 4 over 10 | 92 | 80 | 77 | 69 | 66 | 55 |
| 10 | 5 over 10 | 93 | 81 | 83 | 72 | 67 | 57 |
| 12 | 6 over 10 | 93 | 81 | 84 | 74 | 69 | 58 |

[1] Subsidiary earnings are disregarded if they amount to not more than 69,000 francs *p.a.* in a family with one or two children, or 103,500 francs in a family with three or more children.

[2] Subsidiary earnings are disregarded if they amount to not more than 58,000 francs *p.a.* in a family with one or two children, or 88,000 francs in a family with three or more children.

## APPENDIX 2: FRENCH DIRECT TAXES

There are two different kinds of direct taxes levied on the incomes of earners and rentiers. First, there is the ‘ taxe proportionelle ’, and secondly, there is the ‘ surtaxe progressive ’. All earners in employment are exempt from the ‘ taxe proportionelle ’, the employer paying instead a tax of 5 per cent on all salaries and wages, which tax, however, has to be borne by him and cannot be deducted from the employees’ earnings.

The ‘ taxe proportionelle ’, levied from the rentiers and the self-employed, amounts to 19.8 per cent of their taxable income. For the lowest slice of income, this tax is however reduced to 5 per cent.[1] The upper limit of this slice is 440,000 francs *p.a.* for artisans, non-commercial professional people, and most beneficiaries from annuities, and 300,000 francs for all types of businessmen and farmers.[2] Deductions from this tax are allowed for dependent children as follows: 15 per cent of the tax, up to a maximum of 5,000 francs *p.a.*, for one child; 30 per cent, up to a maximum of 10,000 francs, for two children; 75 per cent, up to a maximum of 25,000 francs, for three children; 100 per cent, up to a maximum of 40,000 francs, for four children. For each additional child, 15,000 francs can be deducted from the tax. The 'taxe proportionelle' is not levied if its total amount would be less than 6,000 francs *p.a.* When the computed tax amounts to between 6,000 francs and 24,000 francs, it is reduced by one-third of the difference between the amount computed and 24,000 francs. Thus, if the calculated tax is 15,000 francs, the tax payable is 12,000 francs, *viz.*, 15,000 francs minus one-third of 9,000 francs.

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[1] Arrangements can also be made for paying a ‘ taxe proportionelle ’ of only 5 per cent on the total taxable income. In that case, the taxable income represents the total earnings of the preceding year, without deductions. This overall tax of 5 per cent, while simplifying the work of tax assessment, has for the taxpayer the advantage that it insures him against supplementary claims for tax underpaid, for the figure of taxable income, once accepted, cannot be altered, unless it can be shown that the initial declaration of income was made with the intention to defraud the inland revenue.

[2] No ‘ taxe proportionelle ’ is payable by small farmers during the first five years of their independence.

The ' surtaxe progressive ' has to be paid by everyone whose income falls within the range of taxable incomes. It is levied in addition to the ' taxe proportionelle ', from those liable to that tax. For the purpose of assessment to the ' surtaxe progressive ', the taxable income of the family is divided by tax units computed in accordance with the family structure. Husband and wife are counted each as one unit, and each dependent child as half a unit. The taxable income is divided by these units and taxed as though each fraction were the independent income of a unit. This method brings considerable tax relief to large families with medium and high incomes. Thus, while a single person with an annual taxable income of 1,750,000 francs paid a ' surtaxe progressive ' on successive slices of his income, of 10 per cent, 15 per cent, 20 per cent, 30 per cent, and 40 per cent, amounting to 390,500 francs *p.a.*, a family with six children was liable to only five times a tax of 10 per cent on 130,000 francs, or 65,000 francs *p.a.* The rates of the ' surtaxe progressive ' are shown in Table 2.

TABLE 2

*Surtaxe Proportionelle*

| Slice of Income per Tax Unit[1] | Tax Levied |
|---|---|
| 1,000 francs | % |
| under 220 | nil |
| 220— 350 | 10 |
| 350— 600 | 15 |
| 600— 900 | 20 |
| 900—1,500 | 30 |
| 1,500—3,000 | 40 |
| 3,000—6,000 | 50 |
| over 6,000 | 60 |

[1] Husband and wife, 2 units; dependent child, ½ unit.

# MEASURING SOVIET INDUSTRIAL GROWTH

## *By* L. R. KLEIN

Mr. Seton is to be congratulated for introducing an objective statistical approach in a field where emotions and personal guesswork are used to attack an essentially statistical problem.[1] In a novel and interesting approach, he forms a regression of manufacturing growth rates for some 14 Western industrial nations on the growth rates of their consumption (inputs) of fuel, steel, and electricity, and from the supposedly reliable estimates of the input growth rates in the Soviet Union during identical time periods he estimates the Soviet manufacturing growth rate. His point estimates are quite acceptable; it is only in connection with the error limits to his estimates that I would like to discuss his findings at greater length. Mr. Seton's error band for the Soviet estimate is constructed by going above and below the point value by the range of residual error in the sample Western data. From error bands so constructed he concludes that ' Even the upper limits of our estimates fall noticeably short of official claims '. In three samples (1929/37, 1937/50, 1950/53) the official estimates lie above the regression planes, but I should say that it is very doubtful in two of the three periods whether one can conclude that the official estimate lies outside a properly constructed set of error limits. *Indeed I shall argue that one cannot reject the hypothesis that the official Soviet estimate is a drawing from the population that produced the Western sample.*

In making an *extra-sample* estimate from a regression function one must take into account at least two types of cumulative error, namely, the error due to the disturbing factors not taken into account explicitly in the function and the sampling error associated with the fact that one uses estimates of the regression parameters and not the true values. Mr. Seton takes into account only the former type of error, and there is a question whether he gives enough weight to that type alone. In his samples the ranges of residual deviations among the Western nations are:

| | |
|---|---|
| 1929/37 | —1.43 to 1.12 |
| 1937/50 | —0.7 to 0.4 |
| 1950/53 | —1.41 to 1.62 |

The standard errors of estimate of each regression, adjusted for degrees of freedom, are :

| | |
|---|---|
| 1929/37 | 0.93 |
| 1937/50 | 0.36 |
| 1950/53 | 1.39 |

He thus sets his error limits at barely more than one standard error unit away from the point value, which is hardly a customary range. At least 1.64 or 1.96 standard error units would be customary. A way of interpreting Mr.

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[1] F. Seton, ' The Tempo of Soviet Industrial Expansion ', BULLETIN, Vol. 20, Feb., 1958, pp. 1–28.

Seton's relatively narrow bands is to say that he is willing to undergo a big risk of making an incorrect assessment of Soviet industrial growth.

W. A. Wallis has recently shown how to construct a region about a regression function which should include, with a given degree of probability, a specified fraction of nonsample observations.[1] Wallis shows that the appropriate region, technically a *tolerance interval*, consists of curved lines. These lines are nearest the regression function at the mean of the sample and bend away from it as one moves in the direction of the independent variable away from the mean. This point is of the utmost importance in the present case, since for two of the three samples the Soviet data are considerably distant from the Western means; therefore one must take account of an added degree of uncertainty in extrapolating the Western function far outside the sample region.

The standard error of an extrapolated value from the regression

$$z = \alpha u + \beta v + \gamma w + \delta + r$$

$z$=manufacturing growth rate ; $u$=fuel growth rate ; $v$=steel growth rate;
$w$=electricity growth rate ; $r$=error.

is given by

$$S^2_{z_e} = S^2_r + \left[\frac{S^2_r}{N} + S^2_a(u_e-\bar{u})^2 + S^2_b(v_e-\bar{v})^2 + S^2_c(w_e-\bar{w})^2 \right.$$
$$\left. +2S_{ab}(u_e-\bar{u})(v_e-\bar{v}) + 2S_{ac}(u_e-\bar{u})(w_e-\bar{w}) + 2S_{bc}(v_e-\bar{v})(w_e-\bar{w})\right]$$

The subscript *e* denotes extrapolation value, and the barred variables are sample means.

$S^2_r$=estimated error variance $N$=sample size

$S^2_a$, $S^2_b$, $S^2_c$=estimates of sampling variances of estimates of $\alpha$, $\beta$, $\gamma$.

$S_{ab}$, $S_{ac}$, $S_{bc}$=estimates of sampling covariances of estimates of $\alpha$, $\beta$, $\gamma$.

Estimates of $S_{z_e}$ for the three samples are

| | |
|---|---|
| 1929/37 | 1.96 |
| 1937/50 | 0.75 |
| 1950/53 | 1.56 |

Wallis shows how to use the bracketed expression and $S^2_r$ in the formula given above for the variance of extrapolation error to construct tolerance intervals for linear regression. These intervals show a range within which a given fraction, *f*, of nonsample observations from the same population would be expected to lie with a probability *p*.

Suppose that *p* is set at 0.95 and *f* at 0.90 (95 per cent probability of enclosing 90 per cent of nonsample observations); the computed intervals associated with the Soviet input values are:

| | |
|---|---|
| 1929/37 | 16.0 ± 4.45 |
| 1937/50 | 5.2 ± 1.36 |
| 1950/53 | 10.7 ± 4.73 |

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[1] W. A. Wallis, 'Tolerance Intervals for Linear Regression', *Second Berkeley Symposium on Mathematical Statistics and Probability*, ed. by J. Neyman (1951: Univ. of California Press) Berkeley, pp. 43–51.

In the first and third period, the intervals include the all-industry official estimates. It is only in the second period when the official estimate is outside the limits. This is a reasonable result since the Soviet input data are near the sample means for 1937/50 but far larger in the other two periods.

In the accompanying diagram, I have plotted the actual rates of growth against those computed from the 1950/53 regression, Mr. Seton's error limits, the official Soviet estimates, and the tolerance interval ($p=0.95$; $f=0.90$).[1] It is apparent that the interval widens as one moves from the mean point to the neighbourhood of the Soviet values. Even at the mean, however, the intervals are drawn at much wider spacing than Mr. Seton's limits. This is largely, but not entirely, due to the selection of smaller risks of incorrect statement than he chooses. If we let $p=0.70$ and $f=0.68$, the interval for 1950/53, at the Soviet input values, shrinks to $10.7 \pm 2.15$. This just barely excludes the official figure for all industry and definitely excludes the large scale industry value. These same risk values for 1929/37 yield an interval of $16.0 \pm 2.40$, which just includes the all industry but excludes the large scale industry figure.

In computing the intervals by Wallis' method, the bracketed expression in the formula for $S^2_{z_e}$ is used to obtain, for given input values, $p$, and $f$, a multiplier of $S_r$. Multiples of $S_r$ above and below the point value determine the tolerance limits. In the 1937/50 sample for $p=0.95$ and $f=0.90$, this multiplier is 3.78 for the Soviet input values. It would have to be nearly 6.0 in order to encompass the official estimates; therefore they are implausible values in this case.

The fact that the official values are, in all three samples, above the estimated regression may be taken as additional information leading one to expect a persistent error in one direction; therefore one may be more interested in a one-sided tolerance interval. Wallis gives approximation formulas for estimates of upper tolerance limits which turn out, for $p=0.95$ and $f=0.90$, to be, in the samples at hand:

| | |
|---|---|
| 1929/37 | $16.0+4.19$ |
| 1937/50 | $5.2+1.04$ |
| 1950/53 | $10.7+3.94$ |

In the first and third periods the all industry estimates are still within the band of uncertainty. Of course, if the second period's band excluded the official estimate for the two-sided interval it would exclude it, *a fortiori*, for the one-sided interval.

As I stated at the beginning of this note, the beauty of Mr. Seton's approach is its objectivity—its reliance on numerical data rather than intuition. If the data are good enough to provide an estimate of a relation, they should be good enough to provide an estimate of the reliability of the function and of extrapolations made from it. The calculations that I have

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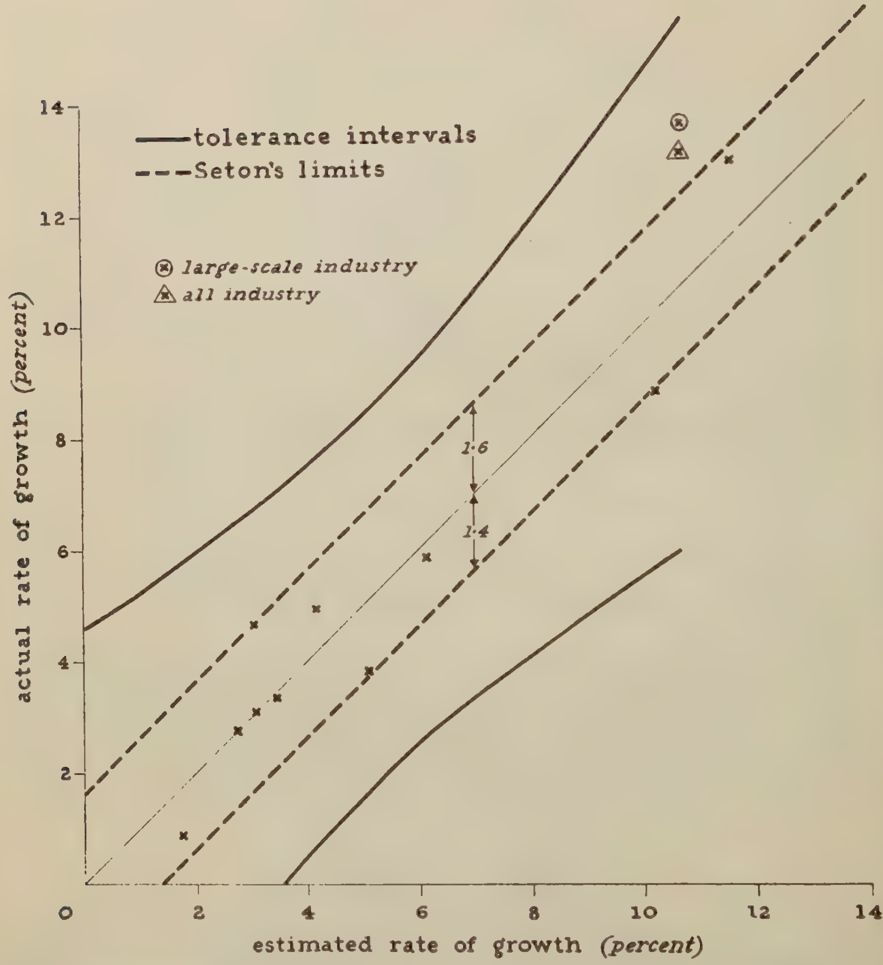
[1] A three dimensional relationship has been 'collapsed' into two in the diagram. The tolerance limits are not unique in these two dimensions but have been drawn on the assumption of a uniform expansion of the independent variables above the mean.

Tolerance Intervals, 1950/53 Regression

(p = 0·95 ; f = 0·90)



made suggest a wide margin of error, or low degree of reliability, but this is surely to be expected in view of the thinness of the sample and the variability of the Western data about the fitted function. The very approximate nature of the technical relation implied by the model is reflected in the variability of the Western data about the fitted function. Given the thinness of the sample and the observed variability, what can we expect to find on extrapolation to regions far away from the main density area of the Western input-output data? If the objective statistical approach is carried to its logical conclusion, the answer is clearly that we can expect to find a wide range of plausible Soviet output estimates. While one cannot reject the official Soviet figures on the statistical evidence of Mr. Seton's sample data, one also cannot reject Hodgman's lower estimates for large scale industry or a fairly wide variety of other values.

Frankly, the intervals are wide and one cannot definitely draw firm conclusions about the relationship between official and Western-implied Soviet estimates. Mr. Seton offers additional analysis of reasons why he believes the official index to be an overstatement of the true situation. These have to do with the weighting system, basing values, and sample coverage. In quantitative terms, do these criticisms of Soviet practice in index number construction produce a result that is in some sense significantly different from those that would be more acceptable to Western-based statisticians? Mr. Seton's research provides a rare opportunity to look into this question, and that is the intent of my calculations above.

On the evidence at hand I see no clear basis for rejecting the official estimates as unduly large. My intuition, pitted against that of the specialists in Soviet statistics, suggests that an economy as under-developed as the Soviet economy could, with great plausibility, show large rewards for large inputs even though the rewards are more modest when inputs are near the Western averages. Who can say whether or not the Soviet economy operates under some form of increasing returns? Error limits indicate that this possibility cannot be ruled out.

# MEASURING SOVIET INDUSTRIAL GROWTH
# A REJOINDER

*By* F. SETON

I am happy to note that Mr. Klein finds my points estimates acceptable. They are, after all, the substance of my paper—his own analysis being in the nature of a further elaboration, however apposite and welcome.

I have nothing but admiration for the technique Mr. Klein uses and for the way in which he uses it. If I feel none the less compelled to take issue with him, it is only to clarify the context in which he places the exercise and the type of agnosticism with which I believe he is entitled to emerge from it.

The first point concerns the original argument of my article which, I am afraid, is made to appear in a somewhat distorted light. Not only did I eschew all attempts to establish tolerance limits in the probability sense of the term, but I specifically stated (p. 12) that the smallness of the statistical population ‘ ruled out (i.e. rendered inconclusive) the tests of significance one would normally wish to make ’.[1] If I none the less decided to place my regression lines within dotted boundaries (Chart I, pp. 19 and 20), it was merely to register a point which Klein himself makes: ‘ the fact that the official values (i.e. the Soviet claims—*F.S.*) are, in all three samples, above the estimated regression may be taken as additional information leading one to expect a persistent error (in the Soviet index—*F.S.*) in one direction ’. In fact, the deviations are not merely in one direction, but also exceed in magnitude the deviations of any of the other countries investigated. My boundary lines were solely intended to give visual emphasis to this point, and must certainly not be interpreted as the ‘ error bands ’ of the estimates. Grateful though I am to Mr. Klein for now supplying the latter, I cannot myself accept responsibility for having drawn them wrongly, or with a reckless disregard for the uniform risk principle, since I did not draw them at all. May I be allowed to mention that I had taken some care to preclude just this misinterpretation by adding a special note under Chart I (p. 19), and again a qualification of the term ‘ limits ’ in Table IV (footnote *c*)?

Mr. Klein is further mistaken in supposing that my rejection of the Soviet claims is based on the magnitude of their deviation from my own, or any other, estimate. In fact it is entirely based on the specific features of the Soviet method of index number construction to which I devoted nearly a third of my article, and which would lead one to expect an upward bias in the result *even if no independent estimate of any sort were available*. The suspicion of bias, which is shared by most Western observers, was the *cause* and not the *result* of the independent computations that have appeared in recent years (including my own). Again, if a reasoned choice between the latter is possible —and I have offered some arguments to support this[2]—it can only be based on the methods which they employ in utilizing the data at hand (more particularly on the presence or absence of demonstrable bias from these methods), and not on the width or shape of tolerance intervals, which as far as I can see none of them is able to establish, and which certainly none of them has ever laid claim to.

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[1] In the light of Mr. Klein's comment I am now inclined to modify this view in my own favour; see below.

[2] In this journal and elsewhere (see ‘An Estimate of Soviet Industrial Expansion ’, *Soviet Studies*, Vol. VII, No. 2, 1955).

Does it follow that Mr. Klein's complete agnosticism as between Soviet claims and Western estimates is justified? I believe there are two points involved here. In the first place I see no reason why revised figures should forfeit all claims to acceptance merely because they lack the statistical testing power to establish the unreliability of the originals (for which other evidence already exists).[1] The literature of most subjects abounds with numerical estimates which are by nature impervious to significance tests. Do we have to conclude that one such figure is as good as another? Surely it is legitimate to prefer estimates whose truth may fairly be deemed more likely than that of others without insisting, before we do so, that we should also know *how much* more likely it is. The fact that such ideal knowledge in the Soviet field, as in so many others, is at present beyond our reach need not, I think, preclude us from using the limited data available to the best possible advantage and forming considered judgments on this basis.

In the second place it seems to me that even where testing power is concerned, my own estimates do not come out as badly as Mr. Klein's verbal summary would seem to imply. Thus, in respect of the phase 1937–50 which covers the more problematic half of the period under review, he is able to conclude from them with 95 per cent probability that a rejection of the Soviet claims would be justified in 9 cases out of 10. True, with regard to the two shorter periods (1928–37 and 1950–55) such a rejection would only be justified in 6 or 7 cases out of 10, and even this can only be vouchsafed with 70 per cent probability (inconclusive though this, it is certainly better than I should myself have thought)[2]. However, Mr. Klein has now been good enough to extend his analysis to my parallel Estimate B,[3] which differs only slightly from the one he originally investigated, and this seems to result in a further improvement of the situation: it turns out that if the (probably slight) effects of serial correlation can be disregarded, a rejection of the Soviet claims in respect of the whole period would with 90 per cent probability be justified in 9 cases out of 10. If I understand Mr. Klein correctly, therefore, his tests are leading him to entertain claims on my behalf which only considerable immodesty could have induced me to make myself.

Finally, in his last paragraph, Mr. Klein voices a misgiving which seems to concern the appropriateness of my method as such: since Soviet Russia, by virtue of her underdeveloped state, should be able to reap increasing returns from her inputs *at a faster rate* than Western countries, she cannot for purposes of estimation be treated as a random drawing from a universe inferred from the latter. The validity of this objection seems to me very uncertain in the present context. In the first place it is doubtful whether the Soviet Union can for most of the period under review be classified as 'underdeveloped'[1] with any greater assurance than some at least of the countries of my Western sample.[2] In the second place it should be remembered that the inputs which enter our regression equations are not the traditional factors of production (labour and capital), but the basic semi-fabricates (steel, fuel, and power) whose use is much more closely geared to the industrial expansion we are trying to measure. Finally, there is abundant evidence in Soviet literature that the constant pressure for growth in output and productivity has often encouraged reckless use of materials and increasing waste, in other words that the institutional features of the system may have acted as a brake on increasing returns (to material inputs) quite as much as possible elements of underdevelopment might have acted in the opposite direction. On the whole it would seem there is less scope for international variations in the time-paths of material utilization, and less predictability one way or the other, than would be needed to support a *prima facie* charge of departure from randomness.

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[1] Let me repeat here that in the case of the Soviet index this evidence is based not on the numerical values involved, but on theoretical considerations of widely recognized validity, e.g. the nature of the weighting used, the treatment of ' new ' goods, etc. As partial confirmation of an empirical kind we may cite Professor Gerschenkron's experiment in which the American index of machinery output was recomputed according to the Soviet recipe and emerged with greatly inflated growth rates from the process.

[2] See particularly point 1 on p. 24 of my article.

[3] See equation IV on p. 14 with the corresponding growth rates in Table IV and the resulting Estimate B in Table V. This estimate, it may be remembered, is constructed to optimize the regression for all countries *and* periods under review.

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*Oxford.*

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[1] To make the objection valid the term 'underdeveloped' would have to be applicable to *industry*, and not necessarily to the economy as a whole.

[2] *E.g.* Greece and Ireland. The number of these is small, but the regression 'takes in' all countries irrespective of size, thus probably over-weighting such regions in relation to the 'developed' parts of the sample.

# FRESH FRUIT AND VEGETABLE STATISTICS IN BRITAIN—A REPLY

*By* George Allen

In the Bulletin of Aug. 1957, Dr. L. G. Bennett criticised the statistical basis of part of my article, ' The Reorganisation of Fruit and Vegetable Wholesale Marketing '.[1] He has pointed out a small defect in one of my estimates used to calculate the extent of unnecessary (as distinct from total) reconsignment of fruit and vegetables between wholesale markets in Britain. I should have added to the estimated value of homegrown produce of £105 million a figure to cover the costs of transporting these supplies from growers to wholesalers. This addition would, at most, be £3 or £4 million. However, I had been extremely generous in my assumption of the extent to which reconsignment trade was economically justified, so that this small error is more than compensated by my caution in allowing that all imported produce should be reconsigned once.[2] To the extent that this assumption exaggerates the need for reconsignment between ports and other markets my calculation will underestimate the unnecessary reconsignment of homegrown produce between markets.

In any case, the strength of my conclusion rests largely upon the fact that two alternative methods of estimating the extent of unnecessary reconsignment give very similar results, each method showing this trade to be large. Dr. Bennett concentrates on the first method used but does not discuss the second and virtually independent calculations centred around my Diagrams I and II and Table IV. Moreover, many of his comments seem to be based on a fundamental misunderstanding. He quotes two of my three estimates of the extent of reconsignment and says that ' the fact that two such widely differing results should have been obtained immediately throws great doubt on their validity '. But his comparison is completely misleading, for these two estimates are distinct: one measures total reconsignment while the other measures that part of total reconsignment which would be unnecessary, given my assumptions, in an ideally adjusted system.

I would be the first to concede the possibility of errors in the statistical material I used, but I am completely unconvinced that Dr. Bennett's statistics are more reliable; on the contrary, they are certainly much less reliable. Moreover, any errors in my statistics are probably not great. The most unreliable sources I used in deriving my estimate (£140 millions) of the extent of total reconsignment was the National Food Survey. My adjustments to the statistics of the Survey and their own possible basic inaccuracies could have led me seriously astray. However, this does not appear to be the case.

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[1] Bulletin, Vol. 18, No. 4, November 1956.

[2] For example, since the publication of my original article, the Runciman Report (paras. 203 and 492) has said that about one quarter of the imported produce landed in London is bought in the country of origin by provincial traders, or consigned directly to them.

Mrs. M. Venning of the Board of Trade has drawn my attention to the fact that Table X of Volume III of the Census of Distribution for 1950 provides statistics of the value of the total trade of fruit and vegetable wholesalers and of their sales to each other, namely of £374.9 millions and £133.9 millions respectively. Allowing for the incomplete response of wholesalers in answering the Census questions which led to this table, these figures completely support my estimates based on the National Food Survey that total reconsignment was about £140 millions, representing some 35 per cent of the value of trade carried out.

It might be, as Dr. Bennett suggests, that the Census of Distribution under-estimates the value of wholesalers' trade and that the highest figure of their sales given in the Census, £396 millions is itself too low. But if so, there is no valid reason for thinking that the error has led me to exaggerate the extent of unnecessary reconsignment, rather the contrary,[1] since the best assumption we can make is that all the statistics used by me are subject to the same *proportional* bias on average.

Further, I cannot see that it is necessary to make any explicit allowance for wastage in calculations based on the statistics I have used.

Dr. Bennett is not correct in saying or suggesting that my estimates of unnecessary reconsignment make no allowances for quantities of fruit and vegetables used in catering establishments. The estimate of total reconsignment, which has no significance other than to give some general indication of the total value of trade between wholesalers, is defective in this respect, although the additional information quoted above from the Census of Distribution suggests that for some reason this weakness is not serious; some errors probably conveniently cancelled each other in the calculations. The two estimates of unnecessary reconsignment do allow for sales to catering establishments for each is based upon the values of all sales to and by wholesalers who will do virtually all of this trade.

Further investigation would undoubtedly improve the working assumptions on which my calculations have been based. But, as I made a particularly generous allowance for the extent to which the reconsignment trade in imported fruit and vegetables should be considered necessary in an ideal system, my working assumptions were extremely unfavourable to my case.

[1] Equally my second method of calculating unnecessary reconsignment makes implicit allowances for variations in consumption per head which are likely to be positively associated with size of town. The trend for ' Other Main Centres ' in Diagram I has been used to calculate the differences between the actual and expected trade in the major ports, shown in Table IV. It suggests that ' Other Main Centres ' as large as London would have sales of £7.5 per head, whereas those with populations between 100,000 and 1,000,000 would have sales per head of £6.5 to £6.8. Since half of the country's population is to be found in conurbations with individual populations less than 800,000 and in their associated hinterlands, these figures show that London's expenditure has already been taken implicitly as some 12 per cent in excess of the national average by using Diagram I for the calculation of Table IV. According to *Studies in Urban Household Diets* 1940–49 (Ministry of Agriculture 1956, pp. 83 and 93) urban working class household expenditure per head on fruit and vegetables was 9 per cent higher in Greater London than the national average in 1949. Allowing for the greater importance of restaurant consumption and middle class expenditure in London its total consumption per head can reasonably be taken as 12 per cent in excess of the national average.

Refinement of the analysis would undoubtedly show unnecessary reconsignment to be greater than I suggested. In these circumstances and in view of the double check within my calculations, any inadequacies in the basic statistics are unlikely to destroy or weaken my main conclusion. Unnecessary reconsignment of homegrown fruit and vegetables between urban markets is an extremely serious problem and points to substantial inertias and frictions restricting competition in the marketing system.

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